SECRET

R.A.F. NARRATIVE

(First Draft)

THE EXPANSION OF THE ROYAL AIR FORCE, 1934 - 1939.

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THE EXPANSION OF THE ROYAL AIR FORCE
1934 - 1939

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CHAPTER I.

THE HOME DEFENCE SCHEME, 1923-31.

The Beginnings of Expansion.

The history of the Royal Air Force in the second world-war embraces naturally a record of the preparations made in the years preceding it to bring the Force to the strength which it had attained at the date of the outbreak. A study of the years 1934-39 is obviously proper to such a survey. Whether it should be extended to an earlier period may be more open to doubt. What happened before 1934 might be considered to be insufficiently related to, or too remote from, the situation in 1939 to be advantageously brought under examination. Nevertheless, it is difficult to dissociate the earlier from the later period. It was in the year 1922 that we first set ourselves to reverse the process of disarming in the air which we had adopted in 1919. The inflation of British air power began in a small way in 1922. A much more important step in the same direction was taken in the following year. The plan for a Home Defence Force which was decided upon in 1923 and was still not fully executed ten years later was the foundation upon which the expansion of 1934-39 was built. The latter expansion did not start ab initio. It began where the earlier one had left off. The two expansions are in fact two chapters of a single story which ran more or less continuously from 1922 to 1939.

It was a story with a number of interruptions. The effect of those which occurred in the earlier stages was to make the eventual expansion more difficult than it would otherwise have been. In an Air Staff note of 10 March, 1935, referring to the particular scheme of expansion then being discussed, these words appear: "It may be said that the roots of our difficulties lie in the slowing down and then the stoppage of the 52 Squadron scheme. Under normal conditions it is impracticable to lay down a carefully thought out programme of development slow it up, stop it for a year or two, and then resume not only at a rate calculated to overtake the delay but also to deal with a further expansion superimposed upon the original scheme". (1)

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(1) A.H.B. Folder V/5/1.

The Need for an Increase.

The close of the first world-war had left us with the strongest air force in the world. It had over 22,000 aeroplanes and seaplanes on charge, (1) a first line strength of 3,300 machines and a muster-roll of over 290,000 officers and men.(2) In personnel and material alike its quality was unmatched. Within a few years this great Force had shrunk to about one-tenth of its strength in 1918. In March, 1923, we had only 371 first-line aeroplanes, all told, and the personnel of the Air Force numbered only a little over 30,000 officers and airmen. We still managed to find the squadrons needed for the Middle East and India, but at home, Sir Samuel Hoare stated in the House of Commons on 14 March, 1923, we had only eight squadrons in all, of which four were allocated to naval co-operation, one to army co-operation, and only three to home defence proper.(3) It is hardly surprising that in these circumstances the need for some better provision for the last of these purposes made itself apparent. Indeed, it had been admitted already. The first step towards remedying the situation had been taken by Sir Samuel Hoare's predecessor, Captain Guest.

The increase in the Air Force which he proposed was announced by Mr. Lloyd George, then still Prime Minister, in the House of Commons on 3 August, 1922. "The Government", said Mr. Lloyd George, "as the result of an enquiry by the Committee of Imperial Defence, have decided to adopt a scheme submitted by the Air Ministry providing a force of 500 machines for home defence at an increased cost of £2,000,000 per annum. £900,000 out of the total of £2,000,000 will be found by economies in the Estimates of the Air Ministry".(4)

The Enquiry of 1921-22.

The enquiry to which Mr. Lloyd George referred was one conducted by a special Sub-Committee which the standing Defence Sub-Committee of the Committee of Imperial Defence set up on 9 November, 1921, "to go fully into the question of the vulnerability of the British Isles to air attack and the measures necessary to provide for meeting such attack".(5)

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(1) Official History, The War in the Air, Appendices, p.154.
(2) H.C.Debates, Vol. 161, Col. 1610, statement by Sir Samuel Hoare, Secretary of State for Air, on 14 March, 1923.
(3) Ibid.
(4) H.C. Debates, Vol.157, Col. 1662. (5) C.I.D.106-A, April, 1922.

It was a very strong Service Sub-Committee, the three Chiefs of Staff, Admiral of the Fleet Earl Beatty, Field Marshal Sir Henry Wilson (replaced on 18 February, 1922, by General the Earl of Cavan) and Air Marshal Sir Hugh Trenchard, with other officers of the Admiralty, War Office and Air Ministry, being members.

The Sub-Committee rendered its report on 26 April, 1922. Appended to the report was a Memorandum which the Air Staff had prepared for it and in which the danger and effect of an attack by the French Air Force were considered. France, apart from increases projected, had available for a possible offensive about 732 aircraft, capable of carrying a total weight of 125 tons of bombs, of which 40 tons could be dropped by night. The bomb load could be raised to 150 tons if converted civil aircraft were used also, and that weight could be dropped in the first twenty-four hours. 110 tons could be dropped in the second twenty-four hours, and 75 tons thereafter indefinitely. London would be likely to be the main objective.(1)

"It is clear", said the Air Staff Memorandum, "that no adequate defence can be made against such air attack as the French are now in a position to bring to bear against the United Kingdom". We had only two single-seater fighter squadrons, and only one night-bombing squadron, to which might be added an extemporised squadron armed with day-bombers, and, if the reserve squadrons were stationed in Great Britain, two further day-bombing squadrons.(2) Units could not be brought home from Egypt, Iraq and India in less than six weeks to two months.(3) It was obvious, therefore, that we were in no position to reply effectively to a French attack. The Air Staff recommended that seven more squadrons should be provided for our offensive organization, bringing the total to eight squadrons(4), that four should be added to our defence organization, bringing the total to six squadrons(5), and that the anti-aircraft gun barrage should be strengthened round London, Chatham, Dover, Sheerness, Shoeburyness, Portsmouth and Southampton.(6)

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(1) C.I.D. 106-A, Air Staff Memorandum, para. 8.

(2) Ibid., paras. 22 and 25.

(3) Ibid., paras. 30-31.

(4) Ibid., para. 52 and Conclusions(10)(a).

(5) Ibid., para. 58 and Conclusions(10)(b).

(6) Ibid., para. 59 and Conclusions (10)(c).

The Sub-Committee in their report refrained from making precise proposals in regard to the volume of the expansion that would be necessary to provide for our defence, and confined themselves to recommending the following measures:-

"(a) The establishment of the Air Force at home should be increased in order to enable an offensive organization to be built up, and

(b) The organization of a zone of defence should be proceeded with".

"It is for His Majesty's Government", they stated "to decide whether the risk of such attack is sufficiently serious to necessitate the provision of defences to meet it. If His Majesty's Government decide that the continental air menace, as outlined in the Air Staff Memorandum, is sufficiently imminent to demand a greater state ~~or~~ of preparedness than now exists, we recommend that, as regards (a), steps should now be taken to strengthen the Air Force at home (1) by increasing the establishment, (2) by forming a reserve, and (3) by fostering civil aviation. As regards (b) we suggest that the General Staff and the Air Staff should immediately confer into a view to establishing an organization to ensure close and effective co-operation between the two services".(1)

The impression which a reading of the report leaves on one's mind is that the Chiefs of the Naval, General and Air Staffs did not attach a great deal of importance to the French air menace at that time. They were probably right. But the politicians were scared and something had to be done about it.

Lord Balfour's and Sir H. Trenchard's Notes.

The Sub-Committee's report was supplemented by some further proposals submitted to the Committee of Imperial Defence by Lord Balfour and Sir Hugh Trenchard, respectively. Lord Balfour's note, dated 29 May, 1922, was alarmist in tone. Our position, he said, was one of extreme peril. We had no means of parrying the blow that might be aimed at us by the French air force. These were only two ways of dealing with

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(1) Report of the Sub-Committee of Committee of Imperial Defence on Continental Air Menace, C.I.D. 106-A, para. 22.

the situation. One was to leave things as they were and to trust to the impossibility of the two Allies coming to blows. The second was to expand the air force at home until it was equal to defending England and retaliating on France. That was a costly way, but Lord Balfour was evidently of opinion that it should be adopted. To leave things as they were would greatly weaken British diplomacy and might "put temptation in the way of French statesmen which they would find it hard to resist".(1)

The note, dated 30 May, 1922, by Sir Hugh Trenchard was much less disquieting. He stated that the Air Staff did not consider it possible to maintain equality of numbers with France without conscription, nor was it necessary "unless the character of the British nation undergoes a great change". "The Air Staff are of opinion that in the first place a small nucleus of 14 squadrons, of which 5 could be on an auxiliary basis, should be formed, with power to expand to 20 squadrons on the outbreak of war. In the course of the next few years, after the nucleus organization had taken shape and become established, it would be necessary to increase it gradually to a strength of 20 squadrons, with power to expand, in the event of war, to 50 squadrons. Without being too optimistic the Air Staff think that this number would be a sufficient deterrent, taking the other services into account. They feel that although we might not be able to send as many squadrons to bomb Paris as the French could send to London, the balance would be to a large extent restored by superior enterprise and efficiency".(2) Here, again one cannot escape the feeling that Sir Hugh Trenchard did not take the idea of a French aggression in the air very seriously. The only other country which might threaten us in the same way was Germany, and she had - as yet - no air force to use against us.

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(1) Note by Lord Balfour on the Report of the Sub-Committee on Continental Air Menace, C.I.D. 108-A, 29 May, 1922.

(2) Cost of measures recommended by the Continental Air Menace Committee to meet the danger of Air Attack from the Continent. Note by the Chief of the Air Staff, C.I.D. 107-A, 30 May, 1922.

Sir Hugh Trenchard revised his proposals a little later and submitted the result in a further note to the Committee of Imperial Defence in July, 1922. In this he recommended the addition of 20 squadrons to the three which then existed for Home Defence or would shortly be available (Nos. 25, 56 and 100). Of the additional 20, he proposed that 15 should be regular and 5 Auxiliary Air Force squadrons. The 23 squadrons, with the addition of machines which could be drawn from other sources on emergency, would make a total of 501 machines "available to cope with such enemy air forces as might attack us".(1) The French independent striking force numbered 596 machines, which might ultimately be increased to 1090 machines, and we should, therefore, still be in a position of inferiority; but the force prepared would nevertheless be a powerful deterrent against any French aggression in the air and the Air Staff considered it sufficient "at the present juncture".(2)

The Government accepted the scheme for an addition of 20 squadrons to our Home Defence Air Force, bringing its total first-line strength to 500 mechanics, and, as already stated, an announcement to this effect was made by Mr. Lloyd George in Parliament on 3 August, 1922. A beginning was made with this programme in the following year. The Air Estimates for 1923-24 provided for an addition of 18 squadrons to the Royal Air Force, 15 of these being for home defence and 3 for co-operation with the Navy.(3)

The Salisbury Committee.

This scheme was superseded almost at once. On 9 March, 1923, the new Prime Minister, Mr. Bonar Law, had appointed a Sub-Committee

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(1) In a further note of August, 1922, Sir H. Trenchard explained more fully how the figure of 501 was obtained. It was rather a hotch-potch; it was made up of (1) 266 machines in the 23 Home Defence squadrons; (2) 36 machines in three Reserve squadrons; (3) 64 to be obtained from training establishments; (4) 60 more from the expansion of establishment from 12 to 15 or 18 machines persquadron; and (5) finally, a "credit" of 25 per cent. on the 302 machines at (1) and (2) in respect of the Immediate Reserve held for them, say 75 further machines. (The French squadrons had no corresponding Immediate Reserve.) (C.I.D. 115-A, August, 1922).

(2) Revised Proposals for the Provision of a Home Defence Force to Meet the Danger of Air Attack from the Continent, C.I.D.111-A, July, 1922.

(3) Statement by Sir Samuel Hoare in the House of Commons on 14 March, 1923, H.C. Debates, Vol.161, Col.1615. He explained that the scheme had been prepared under his predecessor's, Captain Guest's administration.

of the Committee of Imperial Defence to enquire, inter alia, into "the standard to be aimed at for defining the strength of the Air Force for purposes of Home and Imperial Defence." The chairman was Lord Salisbury, and the members were the Chancellor of the Exchequer, the Secretaries of State for Foreign Affaris, Colonies, War, India and Air, the First Lord of the Admiralty, Lord Balfour and Lord Weir; Sir Maurice Hankey was the Secretary. This strong Committee rendered an Interim Report on 12 June, 1923, and a final report at a later date.(1) It was the Interim Report which dealt with the question here discussed, and the recommendations made in it were quoted in the Cabinet paper recording the following decision:-

"(a) That, though regarding it as a melancholy necessity, they (the Cabinet) had no alternative but to approve the Interim Report, the recommendation of which are as follows:-

(1) In addition to meeting the essential air power requirements of the Navy, Army, Indian and overseas commitments (in regard to which a Report will be furnished later), British air power must include a Home Defence Air Force of sufficient strength adequately to protect us against air attack by the strongest air force within striking distance of this country.

(2) That the Air Staff be instructed to draw up detailed proposals for the creation of such a Home Defence Force, to be organised, in part, on a regular and permanent military basis, and, in part, on a volunteer or reserve basis, but so arranged as to ensure that sufficient strength will be immediately available for purposes of defence. The fullest possible use to be made of civilian labour and facilities.

(3) That the first stage of the Air Ministry's scheme, which will absorb our entire capacity for aerial expansion in the immediate future, should provide for a strength of 600 first-line machines - that is to say, a number of machines equal to the independent striking force of the strongest air force within striking distance of this country. The details of this stage should be arranged with a view to the possibility of subsequent expansion, but before any further

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(1) Report of the Sub-Committee of the Committee of Imperial Defence on National and Imperial Defence, Cmd. 2029, 1924, para. 43.

development is put in hand the question should be re-examined in the light of the then air strength of foreign Powers.

(4) To approve a preliminary expenditure by the Air Ministry, in the present financial year, not to exceed £500,000, apart from any savings which the Air Ministry might be able to make on their approved Estimates; this preliminary expenditure to be for the purposes mentioned in Paper C.P. 271(23), the principal heads of which are:-

Purchase of land for aerodromes.

Additional research.

Increase in recruiting machinery.

Immediate increases in officers and other ranks.

Increase in Air Ministry Staff.

(5) That the Lord President of the Council, in consultation with the Secretary of State for Air, should draw up the terms of statement to be made in both Houses of Parliament, which should be approved on behalf of the Cabinet by the Prime Minister and the Secretary of State for Foreign Affairs; this statement to contain an affirmation of the desire of the Government to secure a reduction of aerial as well as other armaments by means of an international agreement."(1)

This Cabinet decision is of great historical interest. What it amounted to was that this country must no longer be left in a condition of inferiority in air strength to any country within bombing range, that we must now move up to parity in this respect with our strongest neighbour, and that in doing so we must leave room for a still greater expansion in the future if it should be necessary.(2) Thus the Salisbury Committee of 1923, and the Cabinet in endorsing it, laid down a principle which, when re-affirmed by Mr. Baldwin in 1934, was thought by many people to be a new one. It was not; it was more than a decade old. It was, indeed, an obvious principle. The steady application of it might well have changed the course of history. But it

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(1) C.P. 32 (23), 20 June, 1923.

(2) It must be added, nevertheless, that the proposed Home Defence Force, including fighters, was merely to give us parity with the French striking force, excluding fighters.

was never applied. Never, in all the years from 1923 to 1939, were we otherwise than in a condition of inferiority in the air to some Power within striking distance of our shores. Almost before they were uttered, the wise words of the statesmen of 1923 had gone with the wind. They never became a rule of action.

The Statement in Parliament.

The statement drawn up in accordance with para. (5) of the Cabinet's decision was made by Mr. Baldwin in the House of Commons and by Lord Curzon in the House of Lords on 26 June, 1923.(1) It differed in form but not in substance from the Cabinet's decision as quoted above; for instance, it spoke in terms of squadrons, not of first-line aircraft, and it omitted the reference to finance. As the programme which was then laid down was often spoken of as "the 52 squadron scheme", the passage in the statement in which that number is mentioned is worth quoting verbatim.

> "In the first instance the Home Defence Force should consist of 52 squadrons to be created with as little delay as possible, and the Secretary of State for Air has been instructed forthwith to take the preliminary steps for carrying this decision into effect. The result of this proposal will be to add 34 squadrons to the authorised strength of the Royal Air Force. The details of the organisation will be arranged with a view to the possibility of subsequent expansion, but before any further development is put in hand the question should be re-examined in the light of the then air strength of foreign Powers."

The statement ended, as had the Cabinet conclusion, in expressing His Majesty's Government's readiness to co-operate with other Governments in limiting the strength of air armaments.

Sir Samuel Hoare's Report, November 1923.

On 3 November, 1923, Sir Samuel Hoare submitted to the Cabinet a paper containing the Air Ministry's proposals for the carrying out of the new scheme of expansion.(2) In a covering memorandum he drew attention to "the length of the period that was likely to elapse before the first

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(1) H.C. Debates, Vol. 165, col. 2142; H.L. Debates, Vol. 54, col. 570.

(2) Provisional Scheme for the Expansion of the Royal Air Force for Home Defence, C.I.D. 120-A, 3 November, 1923.

stage of the expansion programme - viz., to equality with the French Independent Striking Force - is completed. If progress proceeds normally upon the lines indicated in the Report, five years as a minimum will be needed for the completion of the scheme." The implication was that some explanation was called for of the time to be taken for the execution of the scheme. Actually, as will be shown below, it was nowhere near completion in 1928.

The Report stated that the 52 squadrons of the Home Defence Force would consist of 17 Fighting Squadrons and 35 Bombing Squadrons.(1) All the former and 22 of the latter would be regular squadrons; the remaining 13 Bombing Squadrons would consist of 7 Special Reserve Squadrons and 6 Auxiliary Squadrons, that is, of units corresponding respectively to the Militia and Territorial units of the Army.

The 52 squadrons would all have been formed by the end of the year 1928. Three squadrons were already in existence and 15 more would be formed by April, 1925. The remaining 34 would follow thus: 5 squadrons in 1925-26, 10 in 1926-27, 10 in 1927-28, and 9 in the remainder of the calendar year 1928.(2)

The Deceleration of 1925.

By the autumn of 1925, 25 of the 52 squadrons had come into existence.(3) Good progress had then been made. The Government began to wonder whether it need be kept up. The international sky seemed to be brightening. The Treaty of Locarno had been signed, the prospect of war had receded, the projected expansion of the French air force had not materialised, and, finally economy in our expenditure on defence services was being called for from many quarters. The Cabinet accordingly invited its Committee on Air Force Expansion for Home Defence to consider the question of the further development of the scheme, and on 27 November, 1925, the Committee, whose chairman was Lord Birkenhead, submitted its report. This briefly summarised, was that we should not

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(1) There were to be 204 Machines in the Fighting Squadrons and 394 in the Bombing Squadrons. (C.I.D. 120.A)

(2) C.I.D. 120-A.

(3) Memorandum by the Secretary of State for Air in C.P. 421 (25).

drop the scheme but should "go slow". "The present world position", it stated, "would not justify us in cutting down our forces below the limits of safety. In addition to political security, some measure of practical security is required. We are therefore of opinion that the scheme of Air Force expansion announced in 1923 should remain the goal at which we aim and we do not believe that the Cabinet in remitting this question for our consideration had any other thought in their minds". Some postponement of the date of completion was, however, admissible, and the question which the Committee had to decide whether it should be deferred to 1930-31, to 1935-36, or to 1940-41. It came to the conslusion that the middle date should be adopted - 1935-36 - and it recommended the Cabinet to approve such a postponement.(1) The Cabinet did so on 3 December, 1925.(2)

The Government's decision to slow-down the expansion was made known to the House of Commons by Sir Samuel Hoare in his speech introducing the Air Estimates on 25 February, 1926. He explained the small increase proposed in the coming year - two new regular squadrons, with a third squadron which had become available from overseas - by referring to the new situation which had been created by the signing of the Treaty of Locarno and the resulting improvement in the international atmosphere. "To that extent", he said, "it surely justifies us in taking a somewhat longer period than we should otherwise have taken for the completion of the expansion programme."(3)

The Labour Party's Policy.

There was no real disagreement with this view of the situation; indeed, there was a disposition in one quarter of the House to criticise the Government's policy on the ground that it did not take sufficient account of the recent change in our foreign relations. "Surely we might have something better from the Locarno spirit than this estimate of £16,000,000", said Mr. Atlee. "There is no echo of Locarno in these Estimates".(4) "We stand against this policy of expansion", he said later.

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(1) Committee on Air Force Expansion for Home Defence, C.I.D. 145.A.
(2) Cab. 57 (25)
(3) H.C. Debates, Vol. 192, cols. 767-8.
(4) Ibid., col. 783.

"The Secretary of State for Air is very carefully laying the foundation for future wars."(1)

So to describe the modest increase of our Home Defence Force by three squadrons was surely to overstate the case, and the Labour Party's opposition to the increase was in any event not altogether consistent with the policy which it adopted when it took office in January 1924. On 19 February, 1924, Mr. William Leach, the Under-Secretary of State for Air, referred in the House of Commons to the expansion scheme and said: "There is no change in the policy of the Government for the time being in this matter."(2) He repeated this assurance when he introduced the Air Estimates on 11 March, 1924. "The Labour Party", he said, "assumed office almost immediately following the adoption by this House of an enlargement scheme and decided not to interfere with that scheme." Consequently, 8 new squadrons would be formed for home defence in 1924-25, and these with the squadrons already formed would bring the total to 18 by the end of the financial year.(3)

The Meagre Increase, 1925-29.

No doubt the Labour Party's changed attitude to the scheme could be explained by the alteration in the international situation during the intervening period. It went out of office in November, 1924, so that the Estimates for 1925-26 became the responsibility of the Conservative Government which succeeded it. The deceleration of the scheme had not yet been decided upon, and the Estimates for that year included provision for seven new squadrons for home defence - two regular, one special Reserve, and four Auxiliary Air Force -, thus bringing the total number of squadrons under the scheme to 25. In the following year (1926-27), as already explained, only three squadrons were added, and the Estimates for 1927-28 were equally modest; they provided also for three squadrons for home defence - two regular and one non-regular. That meagre increase had to suffice, indeed for two years, for in 1928-29 no addition whatever was made to the Home Defence Force, which had thus

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(1) H.C. Debates, Vol. 192, Col. 785.
(2) H.C. Debates, Vol. 169, Col. 1670.
(3) H.C. Debates Vol. 170, Col. 2182.

been increased by six squadrons only in the three years beginning in April, 1926, and ending in March, 1929.

Something was done towards making good the leeway in the next financial year, 1929-30, when six new squadrons were formed for home defence - two regular, one Cadre (as Special Reserve units were now termed) and three Auxiliary Air Force. In 1930-31 one regular and one Cadre squadron were added, and in 1931-32 three new regular squadrons.

Thus, by the end of the financial year 1931-32, 42 of the 52 squadrons of the original programme were in being. That was still the total two years later, for, as will be seen in the next chapter, no additions whatever were made in 1932-33 and 1933-34.

The Spasmodic Effort to Re-arm.

The progress of the Home Defence programme was, it will be seen, decidedly jerky. In fact, it almost stopped once or twice - and did stop thrice. It started off at a respectable pace, but it soon tired, went into a jog-trot, had a rest now and then, and altogether took a quite disgraceful time to complete the course: indeed, not the full course but only four-fifths of it. Meanwhile, some foreign Powers were increasing their air establishments considerably. Ministers on both sides of the House of Commons were aware of that fact. "Our Air Force", said Mr. Montague when introducing the Air Estimates on 18 March, 1930, "is substantially exceeded in first-line strength by France, Italy and the United States of America, which have made large increases". He drew attention to "the moderation and unprovocative character of British air policy". "His Majesty's Government", he said, "do not propose to deviate from a policy dictated by the firm intention not to be drawn into a competition in armaments."(1)

When asked by Sir Samuel Hoare(2) if the Government's policy was still the same as in 1924, when the Socialist administration announced its agreement with the building-up of a Home Defence Force of

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(1) H.C. Debates, Vol. 236, Col. 1926.

(2) Ibid., col. 1941.

52 squadrons, Mr. Montague had an effective rejoiner to make; he simply referred Sir Samuel Hoare to the latter's own statement of 1926 that the date for completion of the Home Defence programme need not be aimed at and that the advances towards it in the next year or two might be gradual and deliberate. If there was a slowing down, he said, the explanation was that there had been in international relations some considerable progress ever since Locarno.(1)

It fell to Mr. Montague also to introduce the Estimates in the following year, and when he did so, on 17 March, 1931, Sir Samuel Hoare again drew attention to the fact that nine years after the Home Defence Force programme had been adopted we should still have only 42 out of the 52 squadrons then proposed.(2) We had in our whole Air Force, he said, at home and abroad only 790 first-line machines, as compared with France's 1320, Italy's 1100, the United States' 1050 and Russia's 1000.(3) Mr. Montague, who in his opening statement had referred to the rise in expenditure on air armaments in other countries(4), said in replying to the debate; "The policy of retardation, which was accepted and carried out by the past Government as well as by this, was a policy based on the assumption that it was unreasonable to expect a major war within the course of a considerable number of years."(5)

If there was in this forecast, made in the year of Japan's aggression in Manchuria, some evidence of wishful thinking, that fault was certainly not peculiar to the Government in which Mr. Montague was a Minister. A Government of a different political complexion was in office for a much longer period in the years 1923-34 during which the 52 squadron scheme pursued its leisurely course. The fact is that there was in the country as a whole in those years a lamentable ignorance of the effect of the impact of air power upon our national security. People could see that we needed a powerful fleet; they could not see that we

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(1) H.C. Debates, Vol. 236, cols. 1995-6.

(2) He did not allude, naturally enough, to the fact that in 1925 he had agreed to a deceleration which would have meant the completion of the programme only in 1935-36.

(3) H.C. Debates, Vol. 249, col. 1907.

(4) Ibid., col. 1889.

(5) Ibid., col. 1939.

needed a powerful air force too. We were, in truth, absolutely unready to meet an air attack if one should come. Our capital was about the most vulnerable in Europe. We were really existing on sufferance; and no one in authority seemed to worry. A few people did, but their warnings were not heeded. If listened to at all they were put down as cranks or blimps, or, anyway, as bores. Perhaps they did not go about the business of educating the electors and the elected in the right way. However the responsibility for the general apathy is to be assigned, there is no doubt that the history of the half-hearted and spasmodic efforts to re-create British air power in the years 1923-34 is not a very creditable page in our air annals. It is not surprising that the pushful Dictators abroad, who at any rate could get things done, regarded us as a decadent nation.

Chapter II

GENEVAN INTERLUDE, 1932 - 33.

Geneva and Our Expansion.

There would have been a very different kind of expansion in the air if the Conference at Geneva in 1932-33 had done what it set out to do. Possibly there would have been none; more probably there would have been some increase in our air establishments, but it would have been a modest one in comparison with that which we had in fact to make in the six years that followed. The success of the delegates' endeavours might indeed have altered the whole course of recent history. To say that is, of course, to make play with one of history's might-have-beens, which is never a very profitable pastime. What is beyond question is that the interlude of two years affected profoundly our subsequent attempt to build up our air strength to a level with Germany's.

This chapter is not a history of the Disarmament Conference. It is concerned with the Conference only in so far as the proposals that were made and the discussions that took place at Geneva were of a nature of affect our re-armament in the air. It was an episode in the story of that re-armament. It cannot be ignored in any study of the subject.

The Standstill of 1932-33.

The march of our re-arming, modestly planned in 1923, leisurely pursued from the first, reduced almost to a crawl by 1931, came to a full-stop in 1932. We took a holidy from the business of preparing for the next war. We went off on a new tack altogether. We decided to try another way of reaching the haven of national security.

In so deciding we credited other countries with feelings and intentions which we ourselves possessed but some of them, at any rate, did not. We thought that they would be prepared to follow our lead if we set them a good example. They refused obstinately to do anything of the kind. The example which we set went for nothing, probably because it was the wrong kind of example. We were right, abundantly right, to try to bring about limitation of armaments. What is much less certain is whether

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we went about it in the right way. We declared from weakness, so to speak, when we should have declared from strength. We were only fifth among the Powers in air strength. They all knew it; Sir John Simon told the Bureau of the Disarmament Conference on 17 November, 1933.(1) That was bad enough; the standstill order which we imposed on ourselves made the position worse, and did not really impress anyone. We might have accomplished more if we had been in a stronger bargaining position.

A distinguished officer who was a member of our delegation at Geneva and assuredly not prejudiced against the ideals which the Conference sought to make realities, has written:

"The country should not have been allowed to become so defenceless. It has crippled our diplomacy; it has involved enormous risks; it has necessitated great extravagance; and, incidentally, it hopelessly compromised our position at the Conference."(2)

Levelling Down, not Up.

We had begun re-arming in the air because we were weaker in that element that some other States whose global responsibilities were not so great as ours. It was obvious that that state of inferiority could not be allowed to continue indefinitely. There were two ways in which it would be rectified. We could move up to the level of the other Powers, or they could come down to ours. We started the process of moving up in 1923, but it was evident from statements made by Ministers then and in the next few years that we always cherished the hope that we should not have to move up very far, for the welcome reason that the other States would agree to move down.

The policy of reducing and limiting armaments by international agreement had another and very practical argument in its favour just then. The great depression had set in in 1929. In 1931-32 we and many other countries were in the trough of it. We had gone off the gold standard and we were very much more worried about our economic position than about

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(1) The first-line strengths of the Great Powers were estimated by the Air Staff to be on 1 June, 1932:- France, 1613; U.S.S.R., 1174; U.S.A., 1105; Italy, 1012, Great Britain, 748; Japan, 440 (D.C.M.(32) 20, 17 September, 1932).

(2) Major-General A.C. Temperley, The Whispering Gallery of Europe, 1938 p. 170.

our defence. It is noteworthy that in introducing the Air Estimates for 1932-33 on 10 March, 1932, Sir Philip Sassoon, the Under-Secretary of State for Air, explained the cut of £700,000 on the previous year's Estimates on the ground of the need for economy. "The Estimates which I have the honour to introduce to-day", he said, "bear in every part the imprint of a sincere and, I venture to submit, successful effort to contribute substantially towards the urgent requirements of the financial situation, without permanently impairing the high standard of efficiency of the Air Force".(1) So, also, when introducing the next year's Estimates on 14 March, 1933, he said: "The need for economy which left so clear a mark upon the Estimates which I had the honour to introduce into this House last year is no less pressing to-day and has had a similar influence upon the Estimates which are now before the House".(2) It is true that he said a little later, in a reference to the Home Defence Force planned in 1923: "The decision to hold this ten-year old programme in suspense for another year is practical proof of the whole-hearted desire of His Majesty's Government to promote a successful issue of the deliberations of the Disarmament Conference".(3) The natural inference from what he had already said, however, was that the modest nature of the provision proposed for Air Defence was due at least as much to financial as to political considerations.

There are those who believe that the coming of the second world war was directly connected with the great depression of 1929-32. To it, they think, can be traced the re-emergence in an acute form in Germany and Japan of the itch for a Lebensraum or a "co-prosperity sphere" in which economic troubles would be less calamitous. In any event, re-arming with the employment which it gave seemed to be a palliative for some of the current ills. It might be argued that the depression contributed in another way also the the causing of the war; it prompted Britain, who wanted nothing but peace and security, to halt

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(1) H.C. Debates, Vol. 262, Col. 2007.

(2) H.C. Debates, Vol. 275, Col. 1795.

(3) Ibid., Col. 1796.

her re-arming. In halting it, she played into the hands of the dictators. The subsequent tragedy might possibly have been averted if we had been stronger than we were in 1939.

Germany and the Air.

Another practical argument - a political one - in favour of levelling down and not up was that acceptance of the former alternative would have gone some way to sidetrack Germany's demand for an air force.(1) Nominally, and legally, she had none. Actually, and illegally, she had the beginnings of one. This fact is placed beyond doubt by the disclosures in the life of General von Seeckt by his friend, General von Rabenau, in regard to the way in which the former succeeded in preserving and maintaining the nucleus of an air force in Germany from 1920 onwards.

Von Rabenau describes in some detail how Von Seeckt was able to create within the German Army of 100,000 - which was not supposed to have an air arm - an air force skeleton (Fliegergerippe) with air force cells (Fliergerzellen) in the Ministry of Defence, the staff offices and inspectorates, and the defence districts, thus preserving the air tradition of the service. He succeeded in introducing 180 experienced flying officers into the army establishments. They served as a nucleus (Grundstock) of a flying service, and the result was the emergence of a "silent" air officer corps (ein stilles Flieger-offizierkorps). A little later Von Seeckt was wable to link the interests of military and civil aviation by securing the appointment as head of civil aviation in the Ministry of Transport of Hauptmann Brandenburg, an airship commander of the war of 1914-18. After that the control and development of civil aviation was largely directed by the Ministry of Defence. Meanwhile, German officers were being sent abroad to be trained in and to practise flying. After 1926, when the Paris Air Agreement was made, Von Seeckt saw to it that an

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(1) The Cabinet Committee which drafted a"Form of Declaration on Germany's claim to Equality of Rights" had this aspect of the question in mind. They were "influenced by the consideration that if naval and military aviation were abolished Germany could be given complete equality of status without being allowed to re-arm herself in the air". (Cabinet 59 (32), 8 November, 1932).

efficient aircraft industry was developed. "Seeckt's sowings were reaped later", says Von Rabenau.(1)

To these machinations of Seeckt's, however, diplomacy tactfully closed its eyes. Like the mythical Queen of Spain's legs, the German air force in embryo was assumed not to exist. It did exist, and everyone at Geneva in 1932-33 knew that it did.(2)

The Genevan Hares.

If the levelling-down process was carried on far enough, air forces would be reduced to vanishing point. That should have settled the German demand, though that even then there might have emerged an illicit German air force cannot be excluded as a distinct possibility. A proposal that all national forces should be whittled down to zero was in fact made, as will be seen later. The idea was one of a number of hares which were started and pursued in vain.

There were at least four of these hares, and the hunting of each had its ardent advocates in this country. The first was the real and primary quarry of the Conference - the limitation and reduction of armaments. This, the Air Ministry steadfastly urged, should be pursued in preference to all else, though, if not given undue attention, the catching of a secondary hare - the restriction of bombing within reasonable limits - might be taken also by the Conference in its stride. To others, and to the Foreign Office in particular, the question of bombing was by no means secondary. It was so important, indeed, and the effect of a failure to deal with it likely to be so disastrous, that this school was prepared, it seems, to risk losing the original and ostensible objective of the Conference if only a drastic curtailment of bombing, preferably the entire prohibition of it, could be achieved. Even that did not satisfy another school of thought. Nothing less than the disbandment of all national air forces would have satisfied the adherents of this school. Both they and those who did not go quite so far were strongly of opinion that civil aviation - which might be abused for warlike purposes if military aircraft were abolished - should be controlled and possibly internationalized. These various hares caused a great deal of complication at Geneva. They kept doubling across one another's paths and prevented any one line from being steadily followed.

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(1) General F. von Rabenau. Seeckt: Aus Seinem Leben, 1918 - 1936, Leipzig, 1940, pp.528 - 532.

(2) Temperley, op. cit., p.221.

The Effect upon Re-Armament.

Clearly acceptance of any of the various views set forth above would have had repercussions of varying degrees of gravity on our and other nations' programmes of re-armament. Air armaments would have disappeared altogether if the most far-reaching proposal had been adopted, and would have been limited in size, perhaps left without any bomber component, if some of the other views had prevailed. The problem which faced us in 1934 would have been a different one. We should have had to plan another kind of air force than that which we did plan if even the more moderate of the proposals brought forward in 1932-33 had been accepted.

It may be regretted, in the retrospect, that the question of bombing was allowed to absorb so much time at Geneva and to divert attention from the main task entrusted to the Conference. A limitation of armaments might possibly have been brought about if the delegates had concentrated upon that one subject. Nevertheless, their obsession with the problem of bombing was natural enough. The air menace was in all people's minds, and the air menace meant bombing. Curb the bomber, and air warfare would have been robbed of the worst of its terrors. Fighting in the air - horizontal combat - involved no such threat to civil populations as did the vertical assault from the air upon the ground. It was realisation of this truth which inspired the delegates' pre-occupation with a subject which was, after all, only a side-issue. It was a side-issue which had to be explored, some of them argued, before the main advance could be made. In fact, they urged, the only realistic way to approach the general question of air disarmament was first to catch and cage that bird of ill omen, the bomber, and to clip its wings.

The 'Leeper Plan.

Such a line of approach was suggested by the Foreign Office in a paper on "Suggested Lines of Policy in the Disarmament Conference" which Sir John Simon, the Foreign Secretary, circulated to his colleagues in the Cabinet on 19 March, 1932. The paper, dated 18 March, was the work of the late Mr. A.W.A. Leeper, whose signature it bore, and is usually referred to in the State papers of the time as the Leeper plan or

/proposal

proposal.(1) Mr. Leeper's contention was that "the most effective weapon of the aggressor and the weapon to which public opinion throughout the world pays the greatest attention is that of bombing from the air". Our object should therefore be "to take from the aggressor one of his most effective and sudden weapons against his neighbours and to make this prohibition as effective as any treaty prohibition can be". He recommended that His Majesty's Government should consider "the complete prohibition and outlawry in all circumstances of the dropping of bombs from any aircraft on the territory or shipping of another sovereign state."(2)

Mr. Leeper's proposal was vigorously opposed by the Air Staff in a Note dated 23 March, 1932, submitted by Lord Londonderry to the Ministerial Committee on Disarmament on 26 March. The Note pointed out that the effect of the proposal (which, incidentally, would allow us to bomb our own subjects within the Empire but not our enemies) would be that we should be forbidden to send our bombers to attack warships bombarding our shores from outside our territorial waters, or to intercept and to bomb Japanese transports and warships moving to attack Singapore. The proposal, the Note stated, was not only an impracticable one which would never stand the test of war but would do nothing to solve "the major problem of relating and subsequently reducing air armaments, which is presumably our real objective".(3)

A different view was taken by the Admiralty, who suggested that we should support the abolition of all bombing from the air and of all bombing aircraft.(4) A similar suggestion but embracing also submarines and heavy guns was made by the Chief of the Imperial General Staff, War Office, whose Memorandum on the subject was submitted by the Secretary of State for War to the Ministerial Committee a few days later.(5) As will be seen presently, the Conference did actually adopt a resolution which, subject to a provise, prohibited all bombing.

/Meanwhile

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(1) General Temperley speaks of "the late Mr. Alan Leeper, in charge of disarmament in the Foreign Office, who championed it with the fire and vigour of a Crusader". (The Whispering Gallery of Europe, 1938, p. 280).

(2) D.C.(M) 1st Meeting. The Disarmament Committee of the Cabinet was set up by Cabinet decision of 26 January, 1932, Cab.8(32). It consisted of the Prime Minister, the Lord President of the Council, the Lord Privy Seal, the Chancellor of the Exchequer, and any Minister who was a member of the Delegation at Geneva and might happen to be at home at the time the Committee was meeting.

(3) D.C.(M) (32) 7, 23 March, 1932.

(4) D.C.(M) (32) 11, 31 March, 1932.

(5) D.C.(M) (32) 13, 4 April, 1932.

Meanwhile, however, the actual proposal put forward by Mr. Leeper had been given its quietus in the report of a Sub-Committee of the Committee of Imperial Defence which was presided over by Mr. Baldwin and reported early in May. The Sub-Committee's conclusion was that "the proposed prohibition of the act of bombing on the territory and shipping of another sovereign state possesses considerable disadvantages from the point of view of Imperial defence generally and decisive disadvantages from that of the defence of London and other objectives of air attack in the United Kingdom".(1) The Sub-Committee thus accepted the Air Ministry's contention that not only interceptors and anti-aircraft guns but also a counter-offensive force were essential elements of the defence of London and of the country as a whole, and that to suppose that no danger of attack would arise if only a prohibitory convention were signed was to nurse a dangerous illustion.(2)

Mr. Baldwin's Suggestion.

The Baldwin Sub-Committee's verdict was confirmed by the Cabinet, who directed, however, that a revolutionary suggestion put forward by Mr. Baldwin himself should be given further consideration. The suggestion was that the possibility of the entire abolition not merely of bombing but of air warfare as a whole should be investigated; in other words, that we should revert in war to the pre-air era. All military and naval aircraft would disappear, while civil aviation would be placed under international control.(3)

It was an idea which Mr. Baldwin had long entertained. "I am firmly convinced myself", he told the House of Commons six months later, on 10 November, "and have been for some time, that if it were possible the air forces ought all to be abolished". It would be necessary in that event, he added, to control civil aviation, since it might be misused for warlike purposes.(4) The House of Commons listened to his speech, which was an

/impassioned

(1) C.P. 152 (32), 9 May, 1932.

(2) See the Air Staff's contention to this effect in C.P. 272 (32) of 30 July, 1932.

(3) Cabinet 27(32), 11 May, 1932. A week earlier, Mr. Baldwin had stated at the meeting of the Cabinet which discussed air disarmament that "he felt that all talk of achieving serious results by mere reduction and limitation of air armaments, and more especially by trying to civilise war in the air, was really a waste of time. He had been impressed with the appalling consequences of a future war conducted from the air. If the nations were serious on the question of disarmament they ought to agree to scrap all military and naval aviation". The Cabinet, it is recorded, "were impressed by the Lord President's proposal, against which no objection of principle was raised". (Cab. 26(32), 4 May, 1932).

(4) H.C. Debates, Vol. 270, Col. 636.

impassioned appeal to the young men of the country to save civilisation by ridding the world of the menace from the air, with evident sympathy and respect. It could not then be foreseen that air power would be the mainstay of civilisation, not its destroyer, in the great clash of arms that was to come.

The draft of a Convention for the Abolition of Military Aircraft and the Internationalisation of Civil Aviation was in fact prepared in May, 1932, by the Foreign Office.(1) The Air Staff, who had successfully opposed the adoption of the Leeper plan, were naturally not in favour of this new and more far-reaching proposal, and made their attitude to it clear without delay.(2) Although strongly supported by the War Office (3) and the Admiralty (4) and recommended by the Cabinet Committee who considered it, it was not proceeded with at the time, mainly because exploratory enquiries made at Geneva in June, 1932, showed that the French Ministers were not in favour of it.(5) The proposal, it will be seen, was revived at a later date, apparently in the hope that some such strong stimulant might save the moribund Conference from dissolution.

British Disarmament Policy.

It is unnecessary to describe in detail the exchanges of views and the discussions which followed. As a result of them the Government issued on 7 July, 1932, a White Paper, Declaration of British Disarmament Policy, containing a programme for consideration at Geneva.(6) Briefly summarised, the programme was:- (1) Complete prohibition of all bombing from the air save within limits to be laid down as precisely as possible by an international convention, which would also prohibit entirely attacks upon the civilian population. (2) Strict limitation of unladen weight of military and naval aircraft. (3) Restriction in numbers of military and naval aircraft.

/This

(1) C.P. 164(32), 26 May, 1932.

(2) C.P. 181(32), 31 May, 1932.

(3) C.P.176(32), which contains the opinion of the Chief of the Imperial General Staff that the abolition of all naval and military aircraft would be advantageous to us as "tending to restore to us the sea as our first line of defence and as removing the danger of air attack on London".

(4) C.P.182(32), which contains the First Sea Lord's opinion that "aircraft contribute more towards attack upon surface ships than towards their defence", and that abolition of naval and military aircraft would therefore be advantageous to this country.

(5) Cabinet 59(32), 8 Nov., 1932.

(6) Cmd. 4122.

This programme, it will be seen, consisted mainly of the proposals made by the Air Ministry but altered the emphasis of those proposals by pre-fixing to them one for a qualified prohibition of bombing as advocated by the Foreign Office. The White Paper went, in fact, rather farther than the Air Ministry considered to be wise. Our representatives at Geneva went farther still. They assented to the "Benes Resolution" of 23 July, 1932, which provided that the High Contracting Parties should agree as between themselves that all bombardment from the air should be abolished, subject to agreement with regard to means to make observance of this rule effective.

The Secretary of State for Air at once pointed out that there was a substantial difference between the programme contained in the White Paper of 7 July and that embodied in the Resolution of 23 July. The latter, Lord Londonderry warned the Ministerial Committee, was calculated gravely to endanger the defence of the country and the Empire. He urged that "there shall be no further trifling with these dangerous and illusory proposals for the prohibition of air bombardment, which guarantee us no security and must endanger the very foundations of the Empire".(1) A further memorandum submitted be the Secretary of State for Air at the end of August re-inforced the arguments against the Resolution.(2) The Foreign Office replied to them in a membrandum of mid-September.(3)

The White Paper of November, 1932.

As a result the Ministerial Committee invited the Air Ministry to submit concrete proposals for disarmament, and it seemed almost, for a time, as if it might be possible to switch the Disarmament Conference back to the true line and let it get on with the job of disarming. The Air Ministry did its best. It submitted some eminently practical proposals. They were that the French air force - the biggest of all - should be cut by one-third and that the other countries' air forces should be fixed in relation to that reduced figure; that no military aircraft except a

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(1) C.P. 272(32), 30 July, 1932.
(2) D.C.(M) (32) 18, 29 August, 1932.
(3) D.C.(M) (32) 5th Meeting, 15 September, 1932.

flying boat or a troop-carrier should be of a greater unladen weight than three tons; and that air attack should be confined to military objectives and completely prohibited against the civil population.(1) The result of the acceptance of these proposals would have been that air forces in general would have been not only moderately small but equipped with machines of a limited offensive capacity.

The Government, pulled one way by the Air Ministry and another way by the Foreign Office, compromised. A new White Paper was issued on 17 November, 1932, entitled His Majesty's Government's Declaration of Disarmament Policy.(2) It embodied substantially the Air Ministry's proposals referred to in the preceding paragraph, but it included also, and gave pride of place to, the much more ambitious proposal for an enquiry into the practicability of abolishing military and naval aircraft altogether. It thus represented an amalgam of the views of Mr. Baldwin, the Foreign Office and the Air Ministry.

Geneva and the Abolition of Military Aviation.

The fact that it was on British iniative that the far-reaching project for air disarmament down to zero was put forward was underlined when Sir John Simon submitted it to the Bureau of the Conference on 17 November, 1932. His speech left no one in doubt that our Government meant business, that it did honestly wish to have air forces abolished and bombing (for which there was a danger that civil aircraft might be used) prohibited. "His Majesty's Government", he said, "are anxious to co-operate with the other chief Powers in a thorough examination into the practicability of so extensive a scheme".

The examination of the scheme was entrusted to an Air Committee set up by the General Commission of the Conference on 16 February, 1933. It was composed of the representatives, not of the "chief Powers"(3), but of no less than twenty States. Its terms of reference, as suggested by the United Kingdom Delegation, were: "To examine the possibility of the entire abolition of military and naval machines and of bombing from the air, combined with an effective international control of civil aviation."(4)

/At

(1) D.C.(M) (32) 20, 17 September, 1932.
(2) Cmd. 4189.
(3) The United Kingdom had proposed that the Committee should be composed of representatives of "the principal air Powers".(Conf.D.154, 30 January,1933).
(4) Conf. D/C.G./42, 15 February, 1933.

At the first meeting of the Committee on 20 February Lord Londonderry stated that his Government were prepared to subscribe to universal acceptance of the proposed abolition, but made a reservation in regard to "police bombing": a reservation which, as stated later, acquired a good deal of notoriety but was never, in fact, of much consequence.

The Air Committee's quest was unsuccessful. It could not devise any means of ensuring that civil aircraft could not be used, unlawfully, for warlike purposes. Here at home the Ministerial Committee of the Cabinet also undertook an examination of the question. It reported on 7 March, 1933, that no scheme had yet been produced in London or Geneva that could be relied upon to prevent the use of civil aircraft for military and naval purposes, and in particular as bombers. "Consequently", said the report, "the total abolition of military air forces is not practicable and other methods have had to be considered".(1) The recommendations and conclusions of the Ministerial Committee regarding air disarmament were considered and approved on 8 March by the Cabinet.(2)

The British Draft Convention.

It is strange that in spite of this decision by the Cabinet the proposal regarding the abolition of military and naval aircraft was again inserted in the British draft Convention submitted to the Conference on 16 March, 1933.(3) The draft Convention provided that a Permanent Disarmament Commission should work out the best possible schemes for such abolition, coupled with the effective control of civil aviation; alternatively, it was to make proposals for the fixing of the minimum number of machines required by each of the participating states. Tentatively, a table annexed to the Air Clauses assigned an establishment of 500 aircraft to each of the principal Air Powers and proportionately lower numbers for the other states. No mention was made of Germany. Another article provided for the complete prohibition of bombing "except for police purposes in certain outlying regions".

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(1) D.C.(M) 32, 15th Cons. In an earlier report, later withdrawn, the Ministerial Committee accepted the Air Ministry's view that the only way by which immunity from bombing by civil aircraft could be guaranteed was by the maintenance of a force of military aircraft as an antidote. (D.C.(M)(32) 37, 24 February, 1933; D.C.(M)(32) 11th Cons., conclusion (b), 27 February, 1933).

(2) Cabinet 15(33), 8 March, 1933.

(3) Cmd. 4279.

The reservation just mentioned became famous. The insertion of it in the draft Convention was severely criticised in Parliament and the Press. It was defended in the House of Commons by Mr. Eden on 13 June and 5 July, 1933; he showed that it was a very small issue as compared with the great political questions which were holding up the work of the Conference.(1)

Actually, the police bombing reservation was hardly more than a ridiculus mus; and there were lions in the path of the pilgrims of disarmament. There is not the least reason to suppose that it was this which blocked the way to a successful issue at Geneva. The failure of the Conference was really due to "the impossibility of reconciling French demands for security with the German demand for equality of rights".(2)

The End of the Conference.

The British draft Convention was brought forward as a last desperate effort to save the Conference, already clearly doomed - save for a miracle - to shipwreck. It failed to achieve its purpose. The German delegation, which had already once gone on strike (when it withdrew in September, 1932), finally walked out of the Conference on 14 October, 1933, complaining of the "humiliating and dishonouring exactions of the other Powers".(3) That was the end of the Conference, for all practical purposes. It lingered on into 1934 but it might as well have put up the shutters then. Nothing came of its subsequent labours, or of the efforts made in inter-Governmental exchanges to find some measure of agreement upon the questions which had baffled the delegates at Geneva.

Probably the Conference would have failed in any event. The issues which divided Europe were too fundamental to be settled by way of discussion and protocol. More primitive methods were called for if the peace of nations was effectively to be maintained. Possibly something might have resulted if the aim had been less ambitious than it was. A measure of limitation and restriction of armaments might have been achieved if that had been the sole object pursued. It is obvious that the cluttering up of the Conference with a number of side-issues, important, no doubt, but still only side-issued, was not calculated to make the attainment of its ostensible aim the easier.

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(1) H.C. Debates, Vol. 279, col. 129; Vol. 280, col. 372.
(2) Temperley, op. cit., p.277.
(3) Cmd. 4437.

The Effort on our Expansion.

Perhaps, after all, however, it was as well that the Conference did not yield positive results. If it had, the results might not have been to the advantage of our own and other peace-desiring countries. Germany would probably have found means to evade any limitation or prohibition agreed to, and thus we should have had only another melancholy manifestation of "the extraordinary movement by which the partners of one great war disarmed one another in the short period which remained before they were to be partners again in an even greater war".(1) As it was the Conference yielded a nil result and the time devoted to it was therefore wasted. The waste of time was more harmful to us than to other nations. We halted our re-arming. We should probably not have done so if there had been no Conference; we should have gone ahead with the fifty-two squadron scheme. It is true that financial stringency was responsible also for our halting, but undoubtedly the desire not to prejudice the discussions at Geneva was a contributing factor. The halt would not have mattered if other nations had halted, too; but they did not. Germany, in particular, was developing her war-potential throughout those two years. There was no secret about the fact. It was referred to, for instance, in a report in The Times of 24 January, 1934, from that newspaper's correspondent in Berlin. "Actually it is common knowledge", he said, "that military aircraft are constructed in German factories. The process began years ago and has been progressively intensified. There is no reason to doubt that the German aircraft industry is potentially equal to those of other countries or that it could at short notice turn out highly efficient machines. For the last 2½ years no foreign visitors have been allowed into certain factories on the ground that development work was in progress which was not even being shown to members of the German aircraft industry".

Reckon back 2½ years from January, 1934, and one covers the whole active life of the Conference. Go on 2½ years, to mid-1936, and we were to be found already engaged in a fight with time. We lost that fight.

/How

(1) Walter Lippmann, U.S. Foreign Policy, New York, 1932, p.58.

How gladly should we have recalled, if we could, those two sterile years at Geneva. They were indeed the years which the locusts ate. Because of them, though for other reasons, too, we were unable to overtake Germany's lead in the air before she deemed the time ripe to strike.

CHAPTER III

THE EXPANSION SCHEMES, 1934-39.

"Metropolitan Air Force".

In telling the story of the expansion which began in 1934 and was augmented and accelerated in the years that followed, one is constrained, if a clear picture is to be presented, to focus attention on the "Metropolitan Air Force" in this country - indeed, in Germany, too, but then Germany's air force was really all metropolitan. She had a small naval air force, but she had none overseas, for she had no colonies. We, on the other hand, had a Commonwealth and an Empire to claim our attention and their needs were bound to compete to some extent with those of our home defence. The air units stationed abroad became of importance in our struggle for survival at a later date, when, first, Italy and then Japan chose to go to war with us. At the opening of hostilities in September, 1939, however, these countries were neutral, but even if they had become belligerent then it is evident from the records that neither of them was the "enemy" whose re-armament during the fateful years 1934-39 set the pace for our own. It was Germany and Germany alone against whom we prepared reluctantly to measure our strength. In the stern chase upon which we started in July, 1934 - in a rather leisurely fashion at first - our eyes were fixed steadily on Germany's tail-lights to the exclusion of all else. The others were too far away, in comparison, to claim our attention; and, in any event, we had our work cut out to keep that one rival in sight.

The Metropolitan Air Force is consequently, for the purpose of the present examination, the force whose expansion mattered pre-eminently and is entitled on that account to claim the chief attention. The term, it should be explained, meant after 1933 something which it did not always mean before. Previously it had been used in a rather wider sense. In 1931, for instance, one finds it applied to all our air units in this country and in home waters. It is so used in a printed Air Staff Memorandum prepared for the Cabinet on 31 December, 1931, dealing with a question which would arise at the forthcoming Disarmament Conference, namely, the question of parity in the air as between ourselves and the French. (The French air force was then the

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largest in the world). This Memorandum, signed by Marshal of the R.A.F. Sir John Salmond, then Chief of the Air Staff, recommended that we should insist on parity with France in Metropolitan Air Forces and made it clear in a statement of comparative strengths what that term meant. France, it was stated, had the following Metropolitan strength, all the figures being those of first-line aircraft:-

Land-based aircraft in France	1,210
Fleet Air Arm	62
Bombers available by air at short notice from North Africa ...	160
Total	1,432

Great Britain, it was urged, should claim an establishment of:-

Land-based aircraft	1,311
Fleet Air Arm, home waters	121
Re-inforcements available by air at short notice	None
Total	1,432

The total strength of the Royal Air Force at that time, the Memorandum stated, was 785 first-line aircraft, so that a substantial increase would have been needed to give us parity with France.(1)

From at least 1934 onwards the term Metropolitan Air Force was used in the official records in a more restricted sense and as excluding the Fleet Air Arm. That, too, was the meaning ascribed to it in references to the subject in Parliament. In the debate of 22 May, 1935, Sir Philip Sassoon stated specifically that the Metropolitan Air Force of 1500 first-line aircraft then under discussion would not include overseas units "or that portion of the Fleet Air Arm that might happen to be in home waters".(2) Referring to the same programme in the House on 22 July, 1935, the Secretary of State for Air (Sir Philip Cunliffe-Lister) stated; "Both the overseas squadrons and the Fleet Air Arm are excluded entirely from this programme of home defence".(3) That Air Arm is referred to, it is true, in some of the tabular statements of 1934-37 relating to the expansion, but it is not taken into account in computing the strength of the Metropolitan Air Force as given in the tables. When, in 1937, it was decided that the Naval Air Service should be divorced from

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(1) C.P.10(32). Policy in regard to the Limitation of Air Armaments.
(2) H.C. Debates, Vol. 302, Col. 477.
(3) H.C. Debates, Vol. 304, Col. 1564.

the Royal Air Force, it became the practice to omit all reference to the Fleet Air Arm in the particulars of the schemes.

The Metropolitan Air Force can be taken to mean the home-based squadrons which, from 1936 onwards, were administered by the Fighter, Bomber and Coastal Commands. It thus embraced not only the fighter and bomber machines but also the general reconnaissance aircraft (including the flying boats) and the Army co-operation (reconnaissance) aircraft which under the re-organization of that year came under Fighter Command's administration (as Group 22). The inclusion of the last named might seem to be open to question, for they would move with the expeditionary force. They were never, however, a very important element of the total, numbering only 132 (in 11 squadrons) in Scheme F of 1936 and only 108 (in 9 squadrons) in Scheme M of 1938.

The Nature of the Schemes.

A word must be said about the nature of the "Schemes" to which reference is made above and which are dealt with in detail in the following pages. It would be incorrect to think of them as a series of programmes of expansion successively approved and brought into operation, thus representing the actual stages by which the expansion progressed. Actually, the majority of the schemes did not come into operation at all. Why, them, it may be asked, need they be mentioned here? The answer is that they all had an influence on our re-armament in the air. They all came before the Cabinet and served, indirectly at least, to mould the pattern of the expansion. Apart from all else, they had the effect of directing attention to the factors which made the acceptance of them difficult and of prompting investigation of devices for surmounting the obstacles encountered. The programmes which never became operative both linked and developed from and into those which did, and so they cannot be left out of account in the record of our attempt to overtake Germany's lead in the air.

It will be observed that there are gaps in the lettering of the schemes. Scheme A was followed by Scheme C, which was followed by Scheme F and so on. The missing letters represented proposals which did not even reach the stage of becoming schemes in the same sense but to which it was nevertheless convenient at the time when they were discussed within the Air

Ministry to assign distinguishing letters. They were largely variations of earlier schemes, which they left substantially unaltered. For instance, Scheme D proposed an increase in the Initial Equipment of the squadrons as shown in Scheme C.(1) The proposal was not pursued in that particular form but was embodied in Scheme F. One might describe the absentees as schemes which failed, so to speak, to get themselves born. They had no breath of life in them from the first. The others - Schemes A, C, F etc. - may in some instances have had only a short and precarious existence but they did live long enough to find their names in printed State papers and sometimes to be rebaptised at the august font of the Treasury Bench.

The Schemes largely Deterrent.

The purpose for which the Schemes were formed was to try to overtake Germany's lead in the air. They had, however, another, though connected, object too. They were meant to be deterrent. Their purpose was to demonstrate our ability to build "keel for keel" with Germany. By doing that we hoped to induce Herr Hitler and Marshal Goering to call a halt to their schemes. If we could show them that we were ready for a war whose outcome was bound to depend largely on the contestants' relative strength in the air, it was possible that they might think again before proceeding with their plans. That feature of our schemes of expansion must constantly be kept in mind in any study of the subject. There was, in fact, a war of nerves in progress during the years 1934-39.

It is clear from the records that our Government believed that a show of force might induce the rulers of Germany to desist from their designs. Some of our programmes of re-armament were evidently inspired by that belief. They put almost everything into the shop-window and very little into the store-cupboard. The first-line strength which they displayed was achieved sometimes at the expense of the reserves; and reserves are, of course, an indispensable element of air strength that is something more than a façade. Such Schemes as C, H and K, it will be seen later, were unsound in this respect. The first of these had, however, only a very brief life, and the other two never came into operation.

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(1) Minute by Director of Organisation, 10 February, 1936, A.H.B. Folder V/5/4.

Another psychological motive than the deterrent one is to be discerned in at least some of the Schemes. This is made clear in a report dated 7 June, 1935, by a Sub-Committee of the Ministerial Committee on Defence Requirements. The Sub-Committee, of which Sir Maurice Hankey was Chairman, had as its members the three Chiefs of Staff and a Treasury representative. Its report stated, in para. (6): "In view of the agitation that has been aroused as to the danger resulting from the rapid creation of a German Air Force, the Government have deemed it their first duty, both from a national and an international point of view, to make a large increase in the Royal Air Force, partly as a deterrent to Germany and partly in order to assure a more rational state of public opinion."(1) If Germany had to be impressed by our preparations, so, too, had others, including the electors in this country, without whose support the Government would have had no mandate for its policy.

Failure and Success.

Our expansion, so far as it was deterrent in aim, failed to accomplish its purpose. It did not prevent Germany from proceeding with her re-armament in the air or from going to war when she deemed the time ripe. It failed also in so far as it did not enable us to overtake Germany's lead. She was still far stronger than we were in September 1939. Her bomb-salvo was immensely greater than ours. That was achnowledged by Mr. Churchill in his broadcast of 9 February 1941 when he stated that the Germans had been able to drop three or four tons of bombs on us for every one we could drop on them. "We are arranging", he added, "so that presently this will be rather the other way round, but meanwhile London and our big cities have to stand their pounding."(2)

If there was failure, there was success, too, and success in a matter which was of vital moment. There may have been evidence in some of the abortive schemes of a disposition to cling too long to obsolescent types of machines for the sake of swelling numerical strength, but on the whole that tendency was successfully resisted in the schemes that did actually come into operation. In them the balance between quantity and quality was reasonably

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(1) D.C.M. (32) 145.

(2) Quoted in The Times, 10 February, 1941.

well maintained. The need for acceleration did not blind the Government and its advisers to the no less essential need of improvement in technical performance. The discarding of outmoded types was faced courageously even when it involved a reduction in immediate output. The change-over made it more difficult to catch up with Germany in numbers, but it did ensure that we were not surpassed in quality. The policy which we pursued yielded handsome dividends in the end. The first instalment of them was paid in the autumn of 1940, when Fighter Command smashed the Luftwaffe in the Battle of Britain; the second in 1943 when Bomber Command tore the heart out of the industrial Reich.

Mistakes of many kinds were made by those responsible for our air administration before the war. They were reprehensible, but they were atoned for, and more than atoned for, by one great service which was rendered to the nation and indeed to civilisation in those years of gathering storm-clouds. The standard of the Royal Air Force was not lowered. The Force was too small in 1939, but for all that it was the finest air force in the world. It was a superb arm of war. It was entitled to hold, and it did hold, the right of the line in the great struggle for human freedom.

The Last Flicker of Disarmament.

By the spring of 1934 it had become abundantly clear that the Disarmament Conference had failed and that the attempt to bring about limitation by international agreement had no prospect of success. The German delegation had walked out of the Conference on 14 October 1933. Nevertheless, the Foreign Office refused to give up hope of some agreement being reached on the lines of the draft British Convention of March 1933. In January 1934, Sir John Simon submitted to the Cabinet a Memorandum(1) recommending that the proposals in Articles 34-41 of the draft Convention should be maintained with this variation, that if the Permanent Disarmament Commission had not decided within two years, instead of five as originally proposed, on the abolition of military aircraft, all countries should be entitled to possess military aircraft. During the following eight years

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(1) D.C.(M) (32) 79, 9 January, 1934.

such reductions and increases could be made as would result in the end in the figures proposed in Article 41 or some other agreed figures, and Germany could thus again acquire parity with the principal air Powers in ten years. She would not be regarded as entitled to claim military aircraft during the two years of the enquiry into abolition.(1)

Germany's reaction to this proposal was at any rate not a blunt dismissal of it. Her reply of 16 April, 1934, accepted the United Kingdom Memorandum as the basis of a Convention, but qualified the acceptance by an important proviso. This was to the effect that the German Government could not wait two years for the appropriate means of aerial defence. "They wish to possess a defensive air force of short range machines not including bombing planes from the beginning of the convention, the numerical strength of which would not exceed 30 per cent of the combined air forces of Germany's neighbours or 50 per cent of the military aircraft possessed by France (in France itself and in the French North African territories), whichever figure was the less." "Germany does not ask for higher numbers of military aircraft than these during the first five years of a ten-years' convention, but after those five years she claims that the necessary reductions and increases should be made so that she should attain full equality in numbers with the principal air Powers at the end of the ten years of the convention.(2)

Whether the offer thus made, reasonable enough at first sight, was really sincere, and whether if it had been accepted the disaster of 1939 might have been averted, are questions to which no confident answer can be given. As it was, the offer came to nothing. A French note of 17 April, 1934, replying to Sir John Simon's enquiry of 10 April, asking whether France also would accept the United Kingdom Memorandum as the basis of a Convention, put an end to all hope of an agreement. It referred to the recent increases in the German military budget, to German re-armament in general, and to the German para-military organisations. Facts of such exceptional gravity, the note stated, "prove that the German Government, whether of set purpose or not, has made impossible the negotiations the basis of which it has by its own act destroyed."(3) The French view, it must sadly be acknowledged in the

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(1) United Kingdom Memorandum on Disarmament. Cmd. 4512. 29 January, 1934.

(2) Cmd. 4559.

(3) Ibid.

retrospect, was more realistic than that taken in this country at that time. The pity of it is that that normally clear-sighted nation for some inscrutable reason failed to draw the moral of a situation whose gravity it understood and to make the necessary preparations to meet the German menace. Had it done so France would have been producing more in a month than the 73 aircraft which were all that her factories were turning out at the end of 1938, according to a statement made by M. Guy La Chambre, the Air Minister, to the Air Committee of the French Chamber on 1 February, 1939.(1)

The Air Estimates of 1934.

The tremendous event which had occurred in Germany on 30 January, 1933, - the assumption by Herr Hitler of the Chancellorship - was not reflected in our annual Estimates for the defence services either in that year or in 1934. Perhaps it had taken place too recently to influence the former year's Estimates, but one could have expected it to have had some effect on those of the second year. When Sir Philip Sassoon introduced the Air Estimates on 8 March, 1934, he made no reference to anything that had occurred in Germany. The Estimates did indeed differ from those of the two preceding years in so far as they were marked by the abandonment of the standstill policy which had been adopted in 1932. "The Estimates which I present today", he said, "disclose, for the first time after the sacrifices of recent years, a modest upwards trend".(2) It was indeed a modest increase - two new squadrons for home defence and four for the Royal Air Force as a whole. The former addition was particularly meagre in view of the recommendation of the Defence Requirements Sub-Committee of the Cabinet in a report of February that the programme of 1923 for a Home Defence Force of 52 squadrons should be completed at an early date.(3)

Meagre as was the increase, it was large enough to rouse opposition in Parliament. That on this and on some later occasions the Labour Party challenged the policy of rearmament is a fact which it would be a falsification of history to ignore. The expansion of the Air Force

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(1) The Times, 2 February, 1939 - and that output was double the rate of a year before.
(2) H.C. Debates, Vol. 286, Col. 2027.
(3) D.P.R. 82, May 1936.

was opposed by that Party in its earlier stages on the grounds that we were embarking on a competition in armaments, that national defence in the air was a broken reed, and that the sole solution of the problem was the internationalisation of civil aviation and the creation of an international air force.(1) It must in fairness be added that some of the most ardent supporters of expansion were to be found on the Labour benches when the full nature of the German menace had become apparent.

Expansion Begins.

The Government was given its four squadrons, but before long it was back asking Parliament for a much more substantial increase in our air establishment. On 19 July, 1934, statements were made in both Houses on the subject of air defence policy. In the Commons Mr. Baldwin (Lord President of the Council) was the Government spokesman. In reply to a question by Mr. Attlee, he recapitulated the attempts made since 1926 to secure limitation of armaments, and stated that during these 8½ years "misgivings have arisen from time to time in many quarters at the increasing accumulation of deficiencies in our Defence services, particularly in view of the increased expenditure on armaments in many other countries". "The Government's policy", he continued, "remains one of international disarmament, and we have by no means abandoned hope of reaching some limitation." Unfortunately, we could not count on an early result and we had felt for some time that we must reconsider our policy in the absence of comparable reductions by other Powers. Steps would therefore be taken to make good our deficiencies in equipment and stores, but something more than this was necessary in the Royal Air Force. "We have come to the conclusion that we cannot delay any longer measures which will in the next few years bring our air forces to a level more closely approaching that of our nearest neighbour." The international situation would be kept constantly under review, but meanwhile the Government had decided on a programme covering the present and the four ensuing years for increasing the Royal Air Force by 41 new squadrons, including those already announced in the 1934 programme. Of these 41 squadrons, 33 would be allotted to Home Defence, raising the existing 42 squadrons so assigned to a total of 75. The remaining squadrons were for service with the Fleet Air Arm and overseas.(2)

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(1) See Mr. Attlee's arguments to this effect in his speech of 8 March, 1934, H.C. Debates, Vol. 286, Cols. 2044-2047.

(2) H.C. Debates, Vol. 292, Cols. 1274-5.

A similar statement was made by Lord Londonderry, Secretary of State for Air, in the House of Lords on the same day (19 July).(1)

The reference in these statements to "our nearest neighbour" would naturally be taken to point to France rather than Germany, but it was the latter's rearmament which really inspired our own expansion. The increase announced on 19 July had been recommended by the Ministerial Committee on Disarmament in their Interim Report dated 16 July, 1934. In this Report the Committee had made it clear both that the scheme proposed was a deterrent one and that it was its effect upon Germany which they had in view. "The mere announcement of a substantial increase should act as a deterrent to Germany and inspire confidence at home. To this", they said, "we attach the utmost importance".(2)

Scheme A.

The programme thus announced was Scheme A, approved by the Cabinet on 18 July, 1934.(3) It provided for the raising of the Metropolitan Air Force to 84 squadrons when to the 75 referred to in Parliament there were added the four flying boat squadrons and five army co-operation squadrons which were also in this country. As further analysed in the Memorandum of the Secretary of State (Lord Londonderry) accompanying the Air Estimates for 1935-36, the precise addition which it involved was one of 41½ squadrons to the Air Force as a whole, including the Fleet Air Arm, by the end of 1938. Of the 41½, it was stated, 4 were formed in 1934 and 25 more would be formed in 1935 and 1936. That the Government still had hopes that it might be possible to avoid proceeding with the expansion planned was evident from another statement in the same Memorandum. This referred to the Air Pact which had been prepared in February, 1935, and to which it was hoped that the "Locarno Powers" would become parties, engaging themselves to use their air forces against any one of their number committing an act of aggression in the air. The Pact, it was stated, should be "a powerful deterrent to aggression", and His Majesty's Government hoped that "it may facilitate the early limitation of the air forces of the world by general international agreement."

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(1) H.L. Debates, Vol. 93, Cols. 803-5.
(2) C.P. 193(34), para. 11 of Report.
(3) C.P. (29) 34.

The Air Pact.

The hope was doomed to disappointment. Neither the Pact nor the limitation of armaments materialised. The Chiefs of Staff had recommended in February, 1935, that the Pact should not be concluded, or at any rate ratified, until the armament part of the settlement had been negotiated.(1) This recommendation was followed by His Majesty's Government throughout the ensuing negotiations.(2) "We are anxious for an Air Pact accompanied by a limitation", said Sir Samuel Hoare, the Foreign Secretary, in the House of Commons on 11 July, 1935. "We all want an Air ~~Pact~~ Pact. We all want air limitation. The question may then arise why, if we all want an Air ~~Pact~~ Pact and we all want air limitation, why is it that the Air Pact cannot be concluded without further delay?"(3) The answer he gave was that several of the Governments, among them the French, regarded peace as an indivisible whole that could not be dealt with in one part at a time. A Western Pact should be accompanied in their view by Eastern and Danubian Pacts of non-aggression. This view, Sir Samuel Hoare explained, was not shared by Herr Hitler, and consequently a deadlock had been reached. He appealed to Herr Hitler to break it by agreeing to the negotiation of the Eastern and Danubian Pacts.(4) The appeal was fruitless, and the Western Pact consequently failed to materialise.

A further difficulty, not referred to by Sir Samuel Hoare, was that the French Government insisted that the Air Pact should be supplemented by bilateral arrangements between the signatories, providing definitely for the military measures that would be needed to make it effective. To this proposal the German Government was strongly opposed. It objected to anything in the nature of Staff conversations as a sequel to the Pact.(5) The fact that such an objection was raised was in itself enough to arouse suspicion in regard to German sincerity in this whole matter.

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(1) C.I.D. 1161-B.

(2) G. 36(5).

(3) H.C. Debates, Vol. 304, Col. 513.

(4) Ibid, Col. 515

(5) G.(36)5, 2 March, 1936, para. 10 of note by Secretary of State for Air. G.106,640(a)

A Startling Disclosure.

The proposed Air Pact was one of the questions discussed with Herr Hitler when Sir John Simon and Mr. Eden paid their historic visit to Berlin on 25 March, 1935. They returned with some startling information. Questioned by Sir Charles Cayzer in the House of Commons on 3 April, 1935, Sir John Simon replied: "In the course of these conversations the German Chancellor stated in general terms that Germany had reached parity with Great Britain in the air".(1) Whether she had in fact done so at that time cannot be definitely established until the German records are available. That there was room for doubt upon the subject is evident from the reply which Sir Philip Sassoon, the Under-Secretary of State for Air, made to a question in the House a few days later (9 April, 1935). "If all relevant factors are taken into account", he said, "we believe that the Royal Air Force has still a margin of superiority over the German Air Force".(2) On the other hand, Mr. Churchill stated in the debate of 2 May, 1935, that "both in numbers and in quality Germany has already obtained a marked superiority over our home defence air force". Her output, he said, was ten times ours and probably amounted to between 100 and 150 military machines a month.(3)

In the same debate (2 May) the Prime Minister, Mr. Ramsay MacDonald, said, after repeating Sir John Simon's statement of 3 April: "Whatever may be the interpretation of this phrase (parity) in terms of air strength, it undoubtedly indicates that the German Air Force has been expanded to a point considerably in excess of the estimates which we were able to place before the House last year. That is a grave fact, with regard to which both the Government and the Air Ministry have taken immediate notice."(4)

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(1) H.C. Debates, Vol. 300, Col. 337.

(2) Ibid., Col. 967, Lord Londonderry, then Secretary of State for Air, maintains in his book, Wings of Destiny, 1943, that the German strength was not as great as it was claimed to be.

(3) H.C. Debates, Vol. 301, Col. 608. Four weeks later, on 31 May, Mr. Churchill said, "In November, when we are supposed to be 50 per cent stronger, I hazard the melancholy prediction that we shall not be a third, probably not a quarter, of the German air strength." (Vol. 302, Col. 1486).

(4) H.C. Debates, Vol. 301, Col. 575.

On 22 May, Mr. Baldwin (Lord President of the Council) informed the House that after Herr Hitler's disclosure of March regarding parity, "subsequent examination in Berlin revealed the fact from those authorised to speak that he had in mind at that time from 800 to 850 first-line aircraft. In the course of these conversations Herr Hitler made it clear that his goal was parity with France". Mr. Baldwin added that we took the French figure as 1500 first-line aircraft, after deducting aircraft in the (French) Far East, and that was the figure at which we were aiming.(1)

Scheme C.

The revised scheme of expansion prepared in the light of Herr Hitler's admission (or claim), and the subsequent information gleaned in regard to his target figure, was known as Scheme C. It provided for the raising of the Metropolitan Air Force to a total of 123 squadrons, containing 1512 first-line aircraft; it left the figures for the overseas establishment and the Fleet Air Arm as in Scheme A. The programme was to be completed by 31 March, 1937 - an acceleration of two years as compared with Scheme A. It was one of the deterrent schemes and an unsound one when analysed. It was an improvement on Scheme A in so far as it increased the proportion of medium and heavy to light bombers in the striking force, but it suffered from the same grave defect in that it made practically no provision at all for reserves. This weakness in its structure was pointed out by the Chief of the Air Staff in a Memorandum of 2 October, 1935. The Memorandum stated that Scheme C should be adequate to meet an expansion of German first-line strength to 1500 aircraft and should be a strong deterrent, but first-line strength was not enough to ensure security. In air warfare the clash would be immediate, intensive and sustained, and the losses heavy. Wastage must be continuously replaced and provision for reserves must be drastically enlarged. The peace-time production capacity of our industry, however highly organised, would be unable at the outset of hostilities to meet replacement requirements, and a period of several months must elapse before full war production would be possible. To bridge that gap it was necessary to maintain in peace sufficient reserves to enable our squadrons to sustain their operational effort until new production had reached the required level.(2)

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(1) H.C. Debates, Vol. 302, Cols. 367, 368.
(2) D.C.M. (32)145, Memorandum by Chief of the Air Staff.

This, read between the lines, amounted to saying that Scheme C might possibly impress the German Air Ministry but it certainly did not impress our own. It would have given us an Air Force which would have been unable to go on fighting for more than a month or so if, as was quite possible, severe losses were incurred at the outset. We were not to know at that time that the period of respite commonly called the "phoney war" was to postpone the losses until there had been time to build up our reserves. The Air Staff were naturally apprehensive about the unsatisfactory position in regard to reserves which any expert analysis of Scheme C could not fail to detect. As a matter of fact it probably did not achieve its object to impressing the Germans. The finance of it gave it away. It was altogether too cheap.

The Cost of Scheme C.

The superimposition of Scheme C upon Scheme A necessitated a Supplementary Vote for the Air Service. The Air Estimates presented at the end of February, 1935, had been based on Scheme A and provided for an expenditure of only £3,000,000 more than the Estimates of the previous year. In July, 1935, a further Estimate for £5⅓ million was presented, to cover the first charges under Scheme C. A second Supplementary Vote had to be taken subsequently, to meet expenditure partly due to special measures in connection with the Italo-Abyssinian dispute, and partly to payments maturing under the new expansion scheme. Even with these additions the estimated gross expenditure on air services was no more than £31 million. In other words, Herr Hitler's bombshell of March, 1935, had the effect of shaking us up financially in such a very mild fashion that a critic might have been forgiven for thinking that we did not believe in it at all. This feature of our Estimates of 1935 cannot possibly have escaped the notice of the authorities in Germany and must have gone far to neutralise the intended effect of the announcement of the new scheme.

Meanwhile the re-armament of Germany was being lavishly financed. This fact was brought to notice in a report dated 7 June, 1935, drawn up by a Sub-Committee of the Ministerial Committee on Defence Requirements. Para. 3(2) of the report stated that information at the disposal of the Chiefs of Staff, who were members of the Sub-Committee, made it highly

improbable that from a technical point of view Germany would be ready before 1939 to wage aggressive war in the West. This forecast, remarkable for its accuracy, was qualified by a grave warning in a later passage. Para. 3(14) stated: "We feel bound to mention in this connection that reliable evidence is available that Germany is raising - outside the Budget - enormous sums by internal borrowing, and there is no doubt that most of this money is for re-armament . .... Whatever may be the precise total, it remains a fact that stupendous amounts are being spent by Germany for re-armament purposes".(1)

The White Paper on Defence, 1936.

Scheme C was still in force when the Air Estimates for 1936-37 were submitted to the House of Commons on 2 March, 1936, and these Estimates, though higher than those of the previous year, were again far from indicating that we considered guns (or bombs) more important than butter. The evidence in regard to Germany's whole-hearted acceptance of the opposite view was meanwhile accumulating, and on the next day (3 March, 1936) the Government issued a White Paper in which that fact was disclosed and the obvious implication underlined. The Statement Relative to Defence(2) stated (para 12): "German re-armament has been proceeding throughout the year at a steady but rapid rate ..... The German Chancellor informed Sir John Simon last March that Germany was aiming at parity between Great Britain, France and Germany provided that the development of the Soviet Air Force was not such that revision of these figures would become necessary. What has since occurred indicates a continuous development of the German Air Force."

The moral of this development as it affected our own air expansion was drawn in para. 37 of the White Paper. The programme of 1935, it was recalled, was designed to bring up our air strength at home to 123 squadrons with approximately 1500 first-line aircraft. New developments in design would now render it possible to make great additions to the striking power of the Force. The latest types of machine which would shortly come into production showed such improvements in speed, range and

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(1) D.C.M. (32)145.

(2) Cmd. 5107.

carrying capacity as greatly to increase the operational effectiveness of squadrons to be equipped with them. The existing programme would accordingly be varied by effecting certain changes in composition and making some additions to the numbers of aircraft. The result would be to increase the first-line strength in this country to 1750 aircraft, exclusive of the Fleet Air Arm. First-line figures were, however, a misleading criterion of comparative air strengths, the White Paper stated, and the augmentation of offensive and defensive power which would result from the revised plans would be greatly in excess of the numerical increase mentioned.

Scheme F.

The revised plans referred to were embodied in Scheme F, approved by the Cabinet on 25 February, 1936.(1) Its notable features were, first, that it strengthened our air striking force substantially by eliminating all the light bombers and substituting medium bombers, and, secondly, that for the first time it aimed at making adequate provision for war reserves. Because it had this latter aim, the adoption of the scheme prompted the Government to take a step which was to have an important effect upon the constructional side of our expansion. This was the bringing into operation of the system of production in "shadow factories". The intention had been that these factories should be utilised only when war had actually begun, and it was strictly a diversion of them from their proper purpose to resort to them earlier. As, however, they were to be used to build up our war reserves, bringing them into operation in peace could be held to be not inconsistent with the original intention. Further reference is made to these factories in Chapter V.

Scheme F, providing for a Metropolitan Air Force of 124 squadrons with 1736 first-line aircraft, an overseas strength of 37 squadrons with 468 aircraft, and a Fleet Air Arm with the equivalent of 26 squadrons and 312 aircraft, was the longest-lived of all the expansion schemes. It actually ran its full course. Sir Kingsley Wood, Secretary of State for Air, was able to state in the House of Commons on

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(1) Cab. (10) 36.

9 March, 1939, that it would be completed by the appointed date, then only three weeks ahead.(1) It was in fact the only pre-war expansion programme that was completed.

Scheme H.

Next came two of the schemes which wer never actually in operation. The first was Scheme H, of January, 1937, which was inspired by reports of a speeding-up of German re-armament. It was one of the deterrent schemes and admittedly a make-shift one. It did not get very far, however. It was first proposed in an Air Staff Memorandum of 14 January, 1937, submitted to the Cabinet on the same day by Lord Swinton, Secretary of State for Air, with a covering Memorandum of his own, headed "Plan for Further Expansion of the First-line strength of the Royal Air Force".(2) Our aim, Lord Swinton stated, should be to have (a) a striking bomber force not inferior to Germany's and (b) a fighter force of a strength requisite to meet the probable scale of attack. The existing programme (Scheme F) would give us an air striking force of only 1022 first-line bombers by April, 1939, and the Germans would have 1700 bombers by that date. It was vital, Lord Swinton said, to create a larger deterremt force, and he proposed for this purpose the plan set forth in the Air Staff Memorandum.

This provided for an increase in the number of Metropolitan Air Force squadrons from 124 (Scheme F) to 145 and in the number of aircraft from 1736 (Scheme F) to 2422. The increase was not, however, altogether a real one. It was obtained in part by a manipulation of the reserves. The scheme provided for 87 bomber squadrons with 1631 aircraft, but 150 of the aircraft were to be obtained by drawing 3 aircraft for each of 50 squadrons from the reserve on the outbreak of war. The strength in peace of the striking force was to be 1481 aircraft only. A further 180 aircraft would be obtained by retaining at home 10 of the 12 squadrons which were to form for overseas by April, 1939, and whose first-line establishment the scheme proposed to increase from 12 to 18 aircraft. This increase of 6 aircraft per squadron represented a true accession of strength and so did the formation proposed in the scheme of 11 new bomber squadrons (198 aircraft), but otherwise, it will be seen, the increased first-line strength was obtained by the robbing of hen-roosts.

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(1) H.C. Debates, Vol. 344, Col. 2387.
(2) C.P. 18 (37).

That the Air Staff were not very happy about it is evident from their Memorandum, which drew attention to the risks that were involved. "It will be possible", it stated, "to put a larger force into the air at the outbreak of war, but our capacity for sustained operations will be very seriously reduced. The expedient of increasing our immediate fighting capacity by drawing upon the reserves of aircraft and personnel is, therefore, clearly one which could only be adopted as a temporary measure; and if it is employed it will be of the first importance to reprovide a proper basis of those reserves as early as possible."(1)

The memorandum added that the striking force of 1631 aircraft which the scheme provided "would not be numerically equal to the estimated German bomber force of 1700 aircraft, but taking all factors into account it should provide an adequate deterrent against the risk of air attack by Germany in 1939. A material factor is that at that date, in respect of experienced personnel, Germany would be in a position inferior to ourselves."(2) It was emphasised again, in this connection, that "these measures would only be a temporary expedient to meet a transient situation."(3)

It is not altogether surprising that the Cabinet found itself unable to accept Scheme H; the weak points in it were too evident to be overlooked. One part of the proposals was, however, accepted. The Air Staff Memorandum had recommended that 13 new operational stations should be acquired and that large additions should be made to the establishment of short service officers, airmen pilots, apprentices and other airmen. This recommendation the Cabinet approved.(4)

Scheme J.

The other scheme of 1937 that did not come into operation was Scheme J, proposed in October of that year. It was in many respects the best of all the schemes submitted, but it could only have been completed under forced draught, and we were not prepared to put on full steam ahead at that time. It would have involved the mobilization of industry. The

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(1) C.P. 18 (37), para. 3 of Air Staff Memorandum.
(2) C.P. 18 (37), para. 8 of Air Staff Memorandum.
(3) Ibid., para. 9.
(4) Cab. (9) 37, 24 February, 1937.

scheme was proposed by the Air Staff as the result of a full appreciation of German strength and intentions as well as of our requirements overseas.(1) The programme which the Air Staff recommended would have strengthened both our first-line strength and our reserves. It embraced an increase of the Metropolitan Air Force by 30 squadrons, bringing its strength to 2331 aircraft, and of the Air Force overseas by 7 squadrons, making its establishment 644 aircraft, as well as the formation of 4 additional squadrons, with 56 aircraft, for trade defence. It proposed also that the policy governing the production capacity of the aircraft industry should be reconsidered, in order that the additional squadrons might be provided with their appropriate reserves at the earliest possible date.

Scheme J was noteworthy for the strength of the air striking force for which it provided. This was to consist of 90 bomber squadrons, as compared with 70 in Scheme F and 87 in the abortive Scheme H. Though the number of bombers (1442) in the 90 squadrons was less than the number (1631) in the 87 squadrons proposed in Scheme H, it was at any rate a firm number and not the result of juggling with the reserves or the overseas establishment. The striking force was a much more formidable one, too, in so far as it comprised 64 heavy bomber squadrons and 26 medium, as compared with 20 heavy and 65 medium (plus 2 transport-bomber) in Scheme H. The new scheme was also far sounder in the matter of provision for reserves, though even here it was not above criticism.

It provided for the reserves on an all-round basis of 150 per cent of first-line strength. That was the percentage proper to Scheme F: it was carried over, apparently per incuriam, into Schemes H and J. It was arrived at by taking varying rates of wastage for the different classes of aircraft - 210 per cent for medium bomber squadrons, 110 for fighter, and so on - and it was obviously applicable, as an over-all percentage, only to a Force of a certain composition. It should have been reviewed when the ratio of heavy to medium bomber squadrons was altered. An over-all percentage should have been assessed, in fact, for each scheme that was proposed. The intention was to provide in peace a reserve for the wastage during the first three months of war; the wastage for the fourth month would be met, it was

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(1) D.R. (P) 12, circulated with C.P. 316 (37).

assumed, from the Immediate Reserve and Workshops Reserve,(1) and that for the fifth and sixth months from the accumulating output of industry. If the time factor had thus been taken into account a figure of nearly 200 per cent. would have been found to be applicable to Scheme J.(2)

Another and more serious weakness in Scheme J was that it was not due for completion until the summer of 1941. It would have given us a force of nearly 1450 bombers by that date, but Germany would have had rather more than that number by December, 1939 (the former estimate of 1700 bombers by April, 1939, had been cut down). There was thus to be a time-lag of 18 months in our attainment of parity in striking power. This, said the Air Staff, was inevitable if the peace-time conditions of industry, recruitment and training were to be maintained. The scheme, it was added, could not be accelerated so as to advance the date of completion to March, 1940, without resort to industrial measures which would have had an effect on the other Services and on trade and industry in general.(3)

That the measures referred to were not taken at that time cannot but be a matter for regret in view of the historical sequel. Ministers were not to know, however, in December, 1937, that war was coming within two years, or indeed, coming at all. If they had known they would, no doubt, have accepted Scheme J and with it the necessity of a far more ambitious programme of construction, recruitment and training than had hitherto been deemed to be either necessary of practicable. If Scheme J had become operative, and if it had been completed by the spring of 1940, we should have been in a far stronger position in the summer and autumn of that year of crisis than in fact we were.

The scheme did not become operative. It was opposed by the Minister for the Co-ordination of Defence (Sir Thomas Inskip), who considered that the cost of it - £650 million in the years 1937-41 - was too great in view of the limit of £1,500 million which it had been estimated in

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(1) The Immediate and Workshop Reserves were intended to amount to 75 per cent of first-line strength at home and 100 per cent overseas. (Air Staff Memorandum of 11 October, 1937, A.6521, "Organisation and Supply in connection with a new Standard of Air Strength").

(2) Air Staff Memorandum of 11 October, 1937, ubi supra.

(3) Ibid.

the White Paper, Statement relating to Defence Expenditure, dated 16 February, 1937,(1) would be spent on defence during those five years.(2) It was accordingly referred back to the Air Ministry for revision and the preparation of a less ambitious scheme. The Air Ministry thereupon made cuts which reduced the cost during the five years to £607,000,000. Such a reduction was regarded as insufficient, so the Air Ministry tried again. Further cuts in war potential and war reserve, with some other economies, eventually reduced the cost of the scheme to £567,000,000.(3) Thus modified, Scheme J became Scheme K.

Scheme K.

Scheme K, the cut-down version of Scheme J, was not at all as good a scheme. The Air Staff put it forward in accordance with instructions but evidently had no very high opinion of it. A memorandum of the Air Member for Supply and Organisation, dated 11 January, 1938, after referring to the modifications which the Cabinet had requested in Scheme J, went on: "These modifications are necessary purely upon political and financial considerations, and such reductions of the Air Staff requirements as are contained in Scheme K must be viewed as shortages which should be made good in part or whole as and when financial considerations permit."(4) In a note of a later date the Air Staff placed it on record that Scheme K was the best they could do within the financial and political limitations proposed and that it represented "not even the minimum insurance which they considered necessary in the Metropolitan force".(5)

Scheme K cut down the striking force of 90 squadrons (1442 bombers) in Scheme J to 77 squadrons (1360 bomber), and the Metropolitan Air Force as a whole from 158 squadrons (2387 aircraft)(6) to 145 squadrons (2305 aircraft). Like Scheme J, it was due for completion only in 1941, but by 31 March instead of the summer of that year. It thus represented a time-lag, as compared with Germany, of almost the same dimensions, and in view

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(1) Cmd. 5374.

(2) Sir T. Inskip's objection is recorded in C.P. 316(37).

(3) C.P. 65(38), 12 March, 1938.

(4) A.M.S.O's Memorandum of 11 January, 1938, S.42667.

(5) Air Staff Note dated 4 April, 1938, A.H.B. Folder V/5/11.

(6) Including the 4 Trade Defence Squadron (56 aircraft) proposed in Scheme J.

of the fact that the bomber component of it was related to Germany's estimated bomber strength in mid-1938, whereas Scheme J had taken her estimated strength in December, 1939, it was even more behind-hand. It was open, too, to serious objection in regard to the provision which it made - or purported to make - for reserves.

The programme, the Air Staff stated in January, 1938, was "framed for the completion of the first-line requirements, with part reserves, by the end of the financial year 1940-41, whilst the remainder of the reserves should become available, with a few exceptions, about mid-way through the following year".(1) In other words, given the expected wastage in war, the Royal Air Force would not have been able to replace losses fully until the summer of 1942. That meant, shorn of circumlocution, that the scheme was an unsound one; it would have involved either a laying up of some of the squadrons or else the operational employment of all at less than first-line strength. That feature of the scheme was sufficient to condemn it.

It was for a different reason, however, that the scheme was not adopted. It had been prepared before the German seizure of Austria in March, 1938. That event pointed to the need for acceleration in our re-armament, and on 14 March the Cabinet sent the scheme back to the Air Ministry for this purpose.(2)

Scheme L

Scheme L of April, 1938 was the accelerated version of Scheme K. Unlike Schemes H, J and K, it was approved by the Cabinet, on 27 April,(3) and was announced in Parliament on 12 May, 1938. It provided, as Earl Winterton then explained in the House of Commons, for a Metropolitan Air Force of 141 squadrons and approximately 2370 first-line aircraft, to be completed by 31 March, 1940, and for such increases in the overseas and Fleet Air Arm establishments as would bring their first-line strength fo approximately 490 and 500, respectively.(4) A similar statement was made by Lord Swinton in the House of Lords.(5)

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(1) A.M.S.O's Memorandum of 11 January, 1938, A.H.B. Folder V/5/9.
(2) Cab. 13 (38).
(3) Cab. 21 (38). The scheme was outlined in C.P. 86 (38).
(4) H.C. Debates, Vol. 335, col. 1761.
(5) H.L. Debates, Vol. 108, col. 1055.

Though thus announced, the scheme was given the Cabinet's approval not so much in respect of its detailed content as for the programme of construction involved in the execution of it. The execution depended on the capacity of the aircraft industry, and this, it was calculated, would run to an output of only 4000 machines in the first year of the scheme's operation and 8000 in the second, that is, a total of 12,000 aircraft in the two years ending 31 March, 1940. It was to that building programme that the Cabinet gave its approval.(1)

Under Scheme L there was included in the Metropolitan Air Force of 141 squadrons, with 2373 aircraft, a bomber force of 73 squadrons, with 1352 aircraft. There were thus 4 fewer squadrons than under Scheme K, but the numbers of aircraft in the Metropolitan Air Force were higher and in the bomber component only slightly less than in that scheme. The reason was that Scheme L, besides raising the Initial Equipment of the fighter squadrons from 14 to 16 machines, provided for a larger number of medium bomber squadrons (Initial Equipment, 24) and a reduced number of heavy bomber squadrons (I.E. 16).

If the Air Staff had not been happy about Scheme K, they were still more uneasy about Scheme L. In the note dated 4 April, 1938, already quoted, they stated that in their view it fell below the level of safety which they considered necessary. To fulfil the conditions in question the Metropolitan Air Force ought:-

(a) to include a striking force of at least equal strength at any given time to Germany's;

(b) to include a fighter force reasonably adequate to deal with enemy bombers, regard being had to the effects of the operations of the striking force in reducing the scale of attack on us;

(c) to include a sufficient war reserve of aircraft, equipment and trained personnel, backed by a fully adequate war productive capacity both for aircraft and trained personnel, to enable the first-line force to continue operations on the required scale of intensity; /(d)

(1) Cab. 21(38), 27 April, 1938. At the Expansion Progress Meeting on 11 July, 1938, Sir K. Wood stated that "when Scheme L was considered by the Cabinet the Prime Minister had said that the aircraft industry must be given orders which would fill their works to capacity, and that too much regard must not be paid to Scheme L." (E.P.M.130, page 4).

(d) to have a secure base, with adequate anti-aircraft defences and searchlights; and

(e) to be supplemented by a thorough A.R.P. organisation.

Scheme J fulfilled these requirements, but neither Scheme K nor Scheme L did; and even Scheme J involved a serious element of risk in that it could not be completed pari passu with the German programme. The Cabinet had been unable, however, to accept Scheme J, for financial reasons, and had instructed the Air Staff to submit fresh proposals providing for a smaller first-line bomber force and substantially reduced war reserves, but increased production potential. In framing the fresh proposals, said the Air Staff, they had to relate our bomber strength to some German figure, and they took the figure for mid-1938, viz. 1350 bombers, not the figure at which Germany was believed to be ultimately aiming. Obviously, therefore, the new scheme was two years behind the German programme.(1)

The Air Staff's Warning.

The note went on to record the Air Staff's view that Scheme L was very far from providing the "safe air defence against Germany" which it was represented as doing in a Memorandum by the Minister for the Co-ordination of Defence.(2) "The fact remains", the Air Staff stated,"that we are endeavouring to compete with a nation of 70 million people whose whole man-power and industrial capacity had been in effect on a basis of national mobilization for the past four years. And the Air Staff would be failing in their duty were they not to make quite clear the manner and extent to which even the accelerated programme in Scheme L falls below what they regard as the level of safety".

"Our air expansion", it was emphasised, "has been based on the voluntary system and on the principle of non-interference with the normal flow of trade. The latter principle has just been abandoned(3); but we

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(1) Note dated 4 April, 1938 by the Air Staff on Sir T. Inskip's Memorandum on Proposals for Acceleration of the Air Programme (Scheme L), A.H.B. Folder V/5/11.

(2) C.P. 86 (38).

(3) The reference is to a Cabinet decision of 22 March, 1938, Cab.15(38), as the result of which double shifts could be worked in the aircraft industry and peace-time factories diverted to war requirements. Even six months later, however, many of the aircraft firms were working neither night-shifts nor overtime; at an Expansion Progress Meeting on 14 September, 1938, it was decided to press them to do so. (E.P.M. 135, page 7).

are still one year short of the date on which the present approved programme (Scheme F) is due for completion, and actually we are for a variety of reasons behind schedule even for that scheme. And - short of national mobilization on German lines - there is little we can do to improve our standard of war production within the next few dangerous months."(1)

We did not adopt national mobilization. We were very far at that time from the realization of the necessity for it; how far can be judged from one fact. This fact is that in the Spring of 1938 the number of persons engaged in the aircraft industry was approximately 90,000 (it had been 30,000 in 1935).(2) Now, the number employed at the peak of our effort in the last war was 347,112 persons(3); and the building of an aircraft involved then only one-tenth of the man-hours which it involved twenty years later.(4) An air effort comparable to that of 1918 would have been needed to place us in a safe position. How far we had to travel before we could be considered to be making it is evident from this one comparison.

The Dissatisfaction of Press and Parliament.

The uneasiness to which the Air-Staff gave expression was felt in wider circles too. There was a feeling that all was not well in our air administration. It was reflected in the comments and criticisms to be read and heard in Press and Parliament. A leading article in The Times of 22 April, 1938, expressed grave concern about our aircraft production. It quoted without dissent a statement of Colonel Moore-Brabazon's in an article in the Empire Review, that "the fact stands out that with all our effort and expenditure we are getting into a worse position than when we

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(1) Note by the Air Staff, ubi supra, paras. 7 and 8.

(2) The fact was stated in the Secretary of State's Memorandum accompanying the Air Estimates, 1938-39, and also in Lord Swinton's speech in the House of Lords on 12 May, 1938 (H.L. Debates, Vol. 108, col. 1045).

(3) Official History, The War in the Air, Appendices, p.155.

(4) Statement by Sir John Simon, Foreign Secretary, in the House of Commons, 27 September, 1939 (H.C. Debates, Vol. 351, col. 1374). Even in May, 1939, the total labour force of the aircraft industry was only 128,000 (97,000 on airframes and 21,000 on engines); the output was then 170 aircraft a week. (E.P.M. 168, 16 May, 1939, page 13). The number of persons employed in the industry on the outbreak of war was estimated to be approximately 350,000 (E.P.M. 187, 31 October, 1939, page 15). It was only after the war began that the aircraft industry expanded on a great scale. In January, 1944, the number of persons employed on work for the Ministry of Aircraft Production was 1,821,000 (White Paper Cmd. 6564, November, 1944).

started". On 12 May the Parliamentary Correspondent of The Times referred to the anxiety of Government supporters about the position. Their anxiety, he said, was "sincere and withour arrière pensée. The personal vendettas against Lord Swinton had faded out of the picture, there are no cabals, and no hypothetical fifties in a cave .... their (the Members') first anxiety is for air parity".

On the same day (12 May) there were full-dress debates in both Houses of Parliament on the subject of our Air Expansion(1). The Government's defence was in the hands of Lord Swinton in the Lords and of Earl Winterton in the Commons. The debate in the Lords ended - as debates in that House usually do - with the withdrawal of the Motion (by Lord Snell) for papers. In the Commons, Sir Hugh Seely's critical motion was defeated by 299 votes to 131. The voting was not a true index to the feeling of the House.

In both Houses the tones of the debate was distinctly hostile to the Government. The charges made were not in some instances well founded. The comparisons made between Germany and Britain were not far wrong as regards production but were wide of the mark as regards first-line strenght. In the Commons Sir Hugh Seely stated that Germany could produce 400 to 500 machines a month, that she had "something like 3500 first-line machines" at present, and would have 6000 to 8000 in a year's time.(2) "At the present time not only have we not got parity with Germany", said Mr. Attlee, "but we are getting further away from air parity every week and every month".(3) In the Lords, Lord Lothian said that evidence in his possession showed that German production in 1939 would be 6000 or more probably 8000 machines, and that she would be able to maintain "a front line of 8000".(4)

Actually, Germany's output in the Autumn of 1938 was, according to an Air Staff estimate, 600 military machines a month; it was expected to rise to 800 in August, 1939, and to 900 in April, 1940. Her first-line strength was estimated to be 3200 aircraft, which would rise to 4030 by

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(1) H.L. Debates, Vol. 108, cols. 1042-1103; H.C. Debates, Vol. 335, cols. 1749-1880.
(2) H.C. Debates, Vol. 335, cols. 1752, 1753, 1758.
(3) Ibid., col. 1793.
(4) H.L. Debates, Vol. 108, col. 1070.

August, 1939, and to 4540 by April, 1940. Our own monthly output was 300, which was expected to rise to 500 by April, 1939,(1) and possibly 800 by April, 1940. Our first-line Metropolitan strength was stated by the Air Staff to be 1606, which it was hoped would rise to 1890 by August, 1939, and 2381 by April, 1940.(2)

Lord Swinton on Parity.

Whether if these figures had been known to Parliament they would have calmed its apprehensions may well be doubted. The grim fact that emerges from them is that Germany was roughly twice as strong, numerically, as we were, and was expected substantially to retain that lead. As it was, there was clear evidence that neither House was satisfied with the position. Members of all parties were particularly disturbed by Lord Swinton's reference to parity.

"I am not going into a discussion on parity now", he said. "It is a term which I am not sure that even the noble Earl, Lord Baldwin, ever used. It is a bad term, and I will tell my noble friend exactly why I say that. 'Parity' suggests that you take country X and say that there are 10,000 machines in it; therefore in country Y there must also be 10,000 machines. It may be that in country Y there ought to be not 10,000 but 15,000 machines. It is not like opposing fleets, where you are dealing with capital ships, and one capital ship comes and meets another. It is quite a different problem. What a Government has to be satisfied about is this. An attack may be made by a potential agressor. In reply two things are necessary. There is the active defence, the fighter defence, the anti-aircraft defence, which must be sufficient to meet the attack. The size of these defensive forces must obviously be conditioned objectively by the size of the forces which may possibly be brought against it (sic). Secondly, there is the counter-offensive force."(3)

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(1) The figure for August, 1939, was not given.

(2) C.P. 218(38), 25 October, 1938.

(3) H.L. Debates, Vol. 108, col. 1101. The view of Lord Swinton's successor, Sir Kingsley Wood, on the subject of parity is to be inferred from his statement at an Expansion Progress Meeting on 4 August, 1939, that "the position would not be satisfactory until the Air Force was as large as any air force within striking distance". (E.P.M. 179, page 18).

The explanation was not convincing. "We have been most solemnly promised parity", Mr. Churchill had stated in the House of Commons on 27 January, 1937.(1) It was quite evident that we were not only not getting parity but were not even bothering about it any longer. There was a distinct feeling that the country had been let down. A promise had been given and had not been kept. Earl Winterton's apologia in the Commons also left the House in a dissatisfied mood. He made his long defence to "a restless House", said The Times of 13 May. "In no quarter of the House did Lord Winterton's speech seem to have made a great impression and most of the speeches were in a critical vein."

Sir Kingsley Wood becomes Air Minister.

Within a few days, on 16 May, it was announced that Lord Swinton had resigned and that Sir Kingsley Wood had succeeded him as Secretary of State for Air. Lord Weir, who had been helping Lord Swinton at the Air Ministry since May, 1935, resigned at the same time. The immediate result was a relaxation of the political tension that had made itself apparent. On 12 May Mr. Arthur Greenwood had given notice of a motion calling for an enquiry into the state of our air defences and the administration of the department concerned. The motion came on, being moved by Mr. Hugh Dalton, on 25 May, and was defeated by 329 votes to 144.(2) Though it was thus supported by a rather greater number of members than the motion of 12 May had been, the tone of the debate was entirely different. "The reaction in Parliament to the air debate last night", said the Parliamentary Correspondent of The Times on 26 May, "differed from that to be observed on the last occasion. There is far more good will on all sides, and nobody's head is wanted on a charger."

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(1) H.C. Debates, Vol. 319, col. 1014. With the statement quoted in the text one may compare a later one of Mr. Churchill's, made in the House of Commons on 8 May, 1940. Referring to the campaign in Norway he said that we were criticised for never taking the initiative and for waiting always for the enemy to move first. "The reason", he said, "for this serious disadvantage of our not having the initiative is one which cannot speedily be removed, and it is our failure in the last five years to maintain or regain air parity in numbers with Germany ..... The fact of our numerical deficiency in the air, in spite of our superiority in quality, both in men and material - which is, I believe, established - has condemned us, and will condemn us for some time to come, to a great deal of difficulty and suffering and danger, which we must endure with firmness until more favourable conditions can be established, as assuredly they will be established." (H.C. Debates, Vol. 360, col. 1349).

(2) H.C. Debates, Vol. 336, cols. 1233-1354.

The Ministerial change of May, 1938, taken in conjunction with the prod administered to the Air Ministry in the Parliamentary debates which preceded it, resulted in a review of the programme embodied in Scheme L. The necessity for an overhaul of our plans was re-inforced by the occurrence of the Munich crisis at the end of September, 1938. "We must make every effort to escape from the position in which we found ourselves during the recent crisis, when we had less than one week's reserves behind the squadrons", Sir Kingsley Wood informed the Cabinet on 25 October, 1938; "this would have resulted in a rapidly declining scale of effort, especially in the fighter squadrons".(1) His proposals for remedying the situation were approved by the Cabinet on 7 November,(2) and on 10 November he informed the House of Commons about them.

Scheme M.

It had been decided, he said, to increase our first-line fighter strength to about 30 per cent. above the figure in the existing programme (Scheme L). "I propose", he said, "to give the highest priority to the strengthening of our fighter force, that force which is designed to meet the invading bomber in the air".(3) Reserves for this force and also aircraft to train the pilots and crews and to meet peace wastage and the needs of re-equipment would also be provided. The number of fighter aircraft to be ordered under the new scheme plus those already on order would be between 5000 and 6000. Reserves for our counter-offensive force would also be increased.(4)

Scheme M, thus referred to (though not under that name) was a "mopping-up" scheme. It was framed so as to incorporate all outstanding items under previous expansion schemes.(5) The date for its completion was 31 March, 1942, that is, two years after Scheme L. Scheme F was still running, when Scheme M was approved, so that the position was, in effect, that three Schemes covered the period from November 1938 to 31 March, 1939, two the year that followed that date, and one (Scheme M) the two succeeding years. The completion of Scheme M would see the 38 fighter squadrons

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(1) C.P. 218 (38), 25 October, 1938.
(2) Cab. 53 (68).
(3) H.C. Debates, Vol. 341, col. 351.
(4) Ibid., col. 352.
(5) Air Ministry paper S.D. 145, Outline of Expansion Scheme M, 15 May, 1939.

provided for in Scheme L increased to 50 squadrons, and the 26 medium and 47 heavy bomber squadrons of Scheme L transformed into 85 heavy bomber squadrons. The total number of Metropolitan squadrons provided for under Scheme M was 163, with 2549 first-line aircraft; the air striking force was to be 85 heavy bomber squadrons, with 1360 aircraft. The provision for overseas was also greater than that in Scheme L - 49 squadrons with 636 aircraft as compared with the former programme of 39 squadrons with 490 aircraft.

As for Scheme L, so for Scheme M the Cabinet's approval was given rather for an over-all programme of construction than for the precise establishment of squadrons and machines set forth in the scheme. When it came before the Cabinet in November, 1938, the prospect was that the constructional programme authorised in Scheme L - 12,000 aircraft within two years - would probably be completed by the due date (31 March, 1940),(1) and the practical question was what was to be done then. It was decided to increase the 12,000 machines to 17,500, the additional 5,500 to be delivered after 1 April, 1940.

Fighters Preferred to Bombers.

The distinguishing feature of Scheme M was the increased emphasis which it placed on the fighter arm. The reason why it did so was stated in a Memorandum which Sir Kingsley Wood addressed to the Cabinet on 25 October, 1938.(2) In this Memorandum it was stated:-

"We cannot assume that we shall not have to go to war before our programme is completed in every respect, but must take into account the possibility of another crisis occurring at any time within the next two years. We must face the facts that our ground anti-aircraft defences, guns, searchlights and balloons cannot be made up to the full scale for some time to come, and that our arrangements for passive defence and the organisation to fit the country to withstand air attack, though they have

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(1) At an Expansion Progress Meeting on 11 July, 1939, the A.M.D.P. stated that "the successful completion of the programme of 12,000 aircraft for delivery during the two years ending March, 1940, was now in sight", and a slowing-down of production in the autumn of 1939 might be necessary. It was decided not to slow-down. (E.P.M. 175, page 13).

(2) C.P. 218 (38).

made marked progress in the past few months, have not as yet reached a very advanced stage."(1)

"For the present, therefore", Sir Kingsley Wood went on, "I propose to give priority to building up our fighter force as soon as possible with fully adequate reserves both of aircraft and personnel, and to aim at as high an output of fighter aircraft in war as can be secured from that section of the industry devoted to the production of fighter aircraft". He accordingly requested immediate authority for the placing of such orders as would enable the first-line fighter force to be built up to 640, backed by substantial reserves, by 1 April, 1940, and to 800 by the spring of 1941, provision of trained personnel and of accommodation to proceed pari passu.(2)

The fact that largely increased orders were being placed for fighters inevitably became fairly widely known, and the result was a certain amount of criticism of the supposed change in air policy; the Royal Air Force was being made a defensive rather than an offensive force, it was alleged. Sir Kingsley Wood was at pains to rebut such a suggestion. He dealt with it first in a speech at the "Air Night" dinner of the Press Club in London on 18 November, 1938. There had been a tendency in the past, he said, to overstate the argument that the bomber would always get through and to lay undue stress on the claim that the counter-offensive was the only effective means of defence. Developments in recent years had undoubtedly tended, he thought, to reduce the supremacy of the offensive and to add to the actual strength of the defensive in the air, and they had naturally adapted their tactical and strategical policy in the light of recent developments. But that did not mean that we meant to rely exclusively for defence on our fighter aircraft and ground defences. The counter-offensive remained an essential component of our air defence.(3)

Sir Kingsley Wood spoke in a similar strain when he was introducing the Air Estimates in the House of Commons on 9 March, 1939.(4) What it amounted to was that the Baldwin dictum(5) that "the bomber will always get

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(1) C.P. 218 (38), para. 46.

(2) Ibid., para. 47. The authority requested was given.

(3) Quoted in The Times , 19 November, 1938.

(4) H.C. Debates, Vol. 344, col. 2388.

(5) See Mr. Baldwin's speech of 10 November, 1932, H.C. Debates, Vol. 270, col. 632.

through" was no longer accepted as an axiom, but the change of view in no wise implied acceptance of the proposition that a bomber force was unnecessary for defence.

The End of Pre-War Expansion.

Scheme M was the last of the pre-war expansion schemes. Had the war not come until the spring of 1942, and had no new scheme supplanted it, we should have had by that date a Metropolitan Air Force of 2,549 aircraft; but Germany, the Air Staff estimated, already had considerably more than that number at the time when the scheme was put forward.(1) In the upshot, what would have happened under Scheme M by the due date of its completion did not greatly matter, for long before then all programmes, our own and Germany's alike, had been thrown into the melting pot below which crackled the fires of war.

Programmes, indeed, there were after 3 September, 1939, but they were framed against a wholly different background. With general mobilization every industry that could contribute to the war effort was geared to a higher pitch. Three months after the outbreak we were engaged on a programme which would double our aircraft production since the beginning of the war.(2) How well the aircraft industry rose of the occasion can be judged from the volume of the output during the period September, 1939 - June, 1944, as shown by the White Paper issued on 28 November, 1944.(3) In the four months, September - December, 1939, we were producing an average of 730 aircraft and 1,100 engines a month. In the six months, January - June, 1944 we were producing over 2,400 aircraft and 5,200 engines a month. In comparing these figures one must bear in mind that the 2,924 aircraft produced in the four months of 1939 included no heavy bombers, whereas the 14,609 produced in January - June, /1944,

(1) C.P. 218 (38), 25 October, 1938.

(2) Statement by Sir Samuel Hoare, Lord Privy Seal, in the House of Commons on 5 December, 1939 (H.C. Debates, Vol. 355, col. 510). The programme which was in force when the war began envisaged an output of 2,000 aircraft a month within 18 months of the outbreak. (E.M.P. 182, 9 September, 1939). An increase to 3,000 a month was proposed then, to be attained within 2 years (E.P.M. 183, 10 September, 1939), but was found to be impracticable, and the more modest programme of 2,550 a month was adopted. (E.P.M. 185, 26 September, 1939). At the outbreak of war there were orders outstanding for 18,000 aircraft. (E.P.M. 190, 12 December, 1939, page 14).

(3) "Statistics relating to the War Effort of the United Kingdom", Cmd. 6564, page 14.

1944, included 2,889, and that a much higher proportion of the total output was absorbed by training aircraft in 1939 than in 1944. In the whole period September, 1939 - June, 1944, we produced 102,609 aircraft and 208,701 engines, in addition to carrying out major repairs on 60,099 aircraft and 113,005 engines. Our output of aircraft and engines was thus far in excess of that in the first world-war, during which it was 55,093 aircraft and 41,034 engines;(1) and the aircraft then produced contained hardly one heavy bomber as we now understand that term.

Repair Depots.

"The repair of aircraft" stated the White Paper quoted above, "has absorbed an appreciable proportion of the capacity of the industry. For every six aircraft newly produced in 1943, four aircraft underwent major repairs in the United Kingdom".(2) A table in the same pamphlet shows that in the six months, January - June, 1944, over 1,500 aircraft and nearly 4,000 engines were undergoing major repairs in the United Kingdom each month. The volume of the work involved can be appreciated from these figures. It is the more incredible, but is perfectly true, that a year before the war began there was not a single repair depot in the United Kingdom. There had been one, at Henlow, but, the Air Member for Supply and Organisation stated at an Expansion Progress Meeting on 27 September, 1938, it had been converted into a training unit. He emphasised the importance of building up a repair organisation at once.(3) The Air Council thereupon decided to form three Service and three civilian repair depots. The former were to be at Henlow, Sealand and St. Athans when these stations were available. The civilian repair depots, after various other sites had been suggested, were located at Burtonwood near Warrington, at Abbotsinch near Glasgow, and at Stoke-on-Trent. It was only after the war began that the system of repair by contractors was adopted.(4)

/Comparative

(1) Official History, The War in the Air, Appendices, p. 154.

(2) Cmd. 6454, para. 41.

(3) E.P.M. 137, pages 9- 10.

(4) E.P.M. 186, 10 October, 1939, page 10 and Appendix A.

Comparative Strengths in 1939.

There can be little doubt that in 1939 the Luftwaffe had a first-line strength more than twice as great as the nominal, and nearly thrice as great as the effective, first-line strength of our Metropolitan Air Force. The distinction here made between nominal and effective strength is necessary for this reason, that a number of our bomber squadrons were not, in fact, mobilizable, their machines having to be held back to provide reserves for the squadrons that were actually mobilized. To state exactly what our first-line strength really was is in these circumstances a matter of some difficulty. It was certainly not much more than one-third of the German first-line strength. A comparison even less favourable for us was suggested by Lord Beaverbrook, then Lord Privy Seal and formerly Minister of Aircraft Production, in a speech in the House of Lords on 19 January, 1944.(1) He gave the German first-line strength at the beginning of the war as 4,320 aircraft and stated that this was four times as great as our first-line strength: which would make ours about 1,100. The squadrons which we actually mobilized in September, 1939, would account, however, for a total of nearly 1,500 first-line aircraft. Some of these were withdrawn later to serve as training units, and it is possible that the proportion stated by Lord Beaverbrook was then correct; but, taking the beginning of September, we should probably not be far wrong in putting the ratio of the first-line strength of the Luftwaffe to that of the Metropolitan Air Force, as mobilized, as something better than 4,000 to something worse than 1,500.

This conclusion is confirmed by the figures contained in a paper which Sir Kingsley Wood submitted to the War Cabinet on 29 September, 1939. It tabulated the strengths of the British, French and German Air Forces as at 26 September, 1939, as follows:-

/Class

(1) H.L. Debates, Vol. 130, col. 464.

Class of Aircraft	British First Line	British Reserves	French First Line	French Reserves	German First Line	German Reserves
Bomber	536	1450	463	-	1750	1700
Short range bomber	-	-			380	700
Fighters	608	320	634		1215	1700
Long distance reconnaissance ...	-	-	444	Approx. 1600 reserves	360	200
Army Co-operation ...	96	105			310	300
Coastal Reconnaissance	216	125	194		305	300
Fleet Air Arm	204	200				
	1660	2200	1735	1600	4320	4900

The table states that the Germans had in addition 500 transport aircraft in units, with approximately an equal number in reserve. They had no overseas units; we had 415 first-line aircraft overseas and the French 595. If from the 1660 aircraft shown above as our first-line strength the 204 of the F.A.A. are deducted, the Metropolitan Air Force had 1460 first-line machines, while the German, after a corresponding deduction of, say 200 aircraft (the 305 Coastal Reconnaissance and naval aircraft not being distinguished) had 4100. Our strength was thus not much more than one-third of the German.

This ratio flattered us, moreover. The German Air Force had ample reserves behind its first line. We had not. Our weakness in this respect was emphasised in a paper written for the purpose of the Anglo-French Staff Conversations which began in London on 29 March, 1939, and ended, after thirteen meetings, on 3 May. The "British Strategical Memorandum" which was prepared before the meeting stated: "It must be admitted that the Allied Air Forces are very greatly inferior to those of Germany and Italy in air striking power, judged on the basis of first-line strength, and that in April, 1939, the position regarding allied reserves will be most unsatisfactory."(1) The comparative strengths were thus set forth in a tabular statement:-

	Long-range Bombers	Short-range Bombers	Fighters	Army Co-operation and General Purpose	Reconnaissance and Naval Co-operation, excluding ship-borne aircraft	Total
Great Britain: Metropolitan	488	-	496	84	222	1290
Middle East, India and Far East	84	164	42	72	18	380

/Contd,

(1) C.I.D. paper, A.F.C.1, 20 March, 1939, para. 20.

	Long-range bombers	Short-range bombers	Fighters	Army Co-operation and General Purpose	Reconnaissance and Naval Co-operation excluding ship-borne aircraft	Total
France:						
Metropolitan	336	-	466	324	324	1450
N.Africa and Levant	37	66	54	124	42	323
Germany	1580	320	1000	300	500	3700
Italy:						
Italy	444	-	450	225	274	1393
Libya, Dodecanese, E.Africa, Spain	288	-	198	117	9	612
Japan	208	418	429	189	99	1343

A note to the table defines long-range bombers as those with an operational radius of over 350 miles and states that our 488 bombers are the mobilizable strength, after providing for six weeks' reserves by rolling up certain squadrons; the nominal strength was 836 bombers.(1)

A Challenge and the Answer.

The subject of this chapter has been the expansion of the Royal Air Force during the years 1934-39. The simultaneous expansion of the German Air Force cannot be here described. That it was a mighty one will have become evident from what has been said about our own expansion. By the spring of 1939 Germany seemed, indeed, to have obtained a lead which could not be overtaken. In der Luft bin ich der Herr, Marshal Goering is said to have exclaimed at the time of the Munich crisis; and what he said was then true. He dilated on the same theme a few months later, and what he said then was less true. In a speech on 1 March, 1939, "the Day of the German Air Force", he boasted that "fear of the German Air Force, the mightiest in the world, had prevented the war-agitators from barring the way of the peace-loving statesmen to our Fuehrer and to a just understanding". "It is for us", he said, "not only to maintain but to increase the advantage which we undoubtedly have in the air and which even the foreign world admits." "The Air Force", he added, "demands in this year another gigantic and powerful effort. We should think only of securing for the Air Force an advantage which can never be overtaken, happen what will."(2)

/It

(1) Ibid., para. 18.
(2) Quoted in The Times, 2 March, 1939.

It was overtaken. Not only was Germany's advantage wrested from her, but she was reduced to a position of greater disadvantage by far than that under which we had laboured in 1939. On 22 February, 1944, Mr. Churchill used these words in the House of Commons:-

"Our production of aircraft, fighters and bombers, judged by every possible test, already far exceeds that of the Germans. The Russian production is about equal to ours. The American production alone is double or treble the German production. When I speak of production, I mean not only that of aircraft, not only of the machines, but of all that vast organisation of training schools and ancillary services which minister to air power and without whose efficiency air power could not manifest itself."(1)

We had accepted Germany's challenge in the air and beaten her to the ropes. The once mighty Luftwaffe was a fallen giant by 1944. Its degradation was complete when it had perforce to turn over the job of raiding Britain to the nasty mechanical contrivance which was known officially as the flying bomb and unofficially as the doodle-bug. It was in itself evidence that the Germans do not understand either air power or human nature.

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(1) H.C. Debates, Vol. 397, col. 684.

CHAPTER IV

MODERNISATION DURING EXPANSION

The Transformation, 1934-39.

Our Air Force was not only expanded in the years 1934-39, it was also transformed almost out of all knowing. It was the effecting of that transformation that made the expansion a matter of such difficulty. At the end of the period it had become not only a far larger force but for all practical purposes an entirely different kind of force. In 1934 it was a force of wooden biplanes. In 1939 it was a force of metal monoplanes. Some biplanes did remain but they were few and, mainly, obsolescent. Not all were obsolescent; in the Fleet Air Arm the Swordfish biplane, followed by the Albacore biplane, was to survive and to perform invaluable service during five years or more of active service. The Gladiator, too, showed itself still to be a doughty old warrior. These were exceptions. Broadly, the biplane had given place to the monoplane by the time the war began.

To read the pages of the Air Force List which set forth the details of the squadrons and their equipment in January, 1934, is to find oneself in an unfamiliar aeronautical world; a world of types which are now but memories and which pilots and air crews of the present day would regard almost as museum pieces, as prehistoric survivals of the era of the Wrights and Farmans. It is difficult now to believe that only five or six years before the war began our Air Force was equipped as it was then.

The Machines of 1934.

Our single-seater fighters were then the Bulldog, with which 9 squadrons were equipped and the Fury (3 squadrons): there was also one two-seater fighter squadron (Demon). The bombers, mostly single-engine, were the Wapiti, which, as a bomber, was the equipment of 11 squadrons, the Hart (9 squadrons), the Gordon (5 squadrons), the Virginia (4 squadrons) and the Fairey III F (2 squadrons): a Heyford, a Hinaidi, a Vildebeeste, a Sidestrand and a Wallace squadron made up the balance of the striking force. There were also three torpedo-bomber squadrons using Horsleys and two bomber-transport squadrons using Victorias. For army co-operation there were 5 Audax and 4 Wapiti squadrons and one Atlas squadron. The sea-going types were the Southampton, Rangoon and Iris flying boats.

It was only slowly that these types yielded place to others in the years that followed: how slowly, one can see if one dips into the programmes of the Air Force Displays at Hendon. Even in 1936, although the Spitfire and the Hurricane appeared in the march-past of the new machines, all the aircraft which took part in the flying events were biplanes. The fighters that competed were the Gloster Gauntlet, the Hawker Demon, the Bristol Bulldog and the Hawker Hart. Next year, 1937, when the last display was held at Hendon, one or two of the new monoplanes are to be found among a far greater number of biplanes taking part in the demonstration. A Fairey Battle and a Bristol Blenehim were entered in Event A, the headquarters race; all the other competitors were biplanes. The fighters of that year were, again, the Gauntlet and the Demon, with the Gladiator and the Fury.

The Scene Begins to Change.

In 1938, the picture begins to change. Instead of the centralised pageant, local displays were organised on "Empire Air Day" at the end of May in that year. There one could see on view the machines which were to become famous names in our history; the Hurricane, the Spitfire, the Wellington, the Hampden, with the Battle and Blenheim medium bombers, as well as the Lysander, the Harrow and the Gladiator. At the similar displays in 1939 these and other types were again on show. The old order was clearly passing and the new one was marching on.

The winter of 1938 was really the dividing line between the old order and the new. In that year our equipment was in the transitional stage, with the obsolescent, indeed obsolete, types predominating and the replacements for them not yet available in quantity. It was, therefore, in an unsatisfactory state. That was evident from what was said in the debates in Parliament on 15 March, 12 May and 15 May, 1938, when a formidable indictment was framed against the Government on this account. In the debate of 12 May Earl Winterton claimed that we were "not behind other countries in the newness or up-to-dateness of our aircraft"; a claim which was categorically disputed by Sir Hugh Seely and Mr. Churchill,(1) and could not indeed be sustained on the facts of the case. In the debate of 15 March Mr. Oliver Simmonds had stated that the bulk of our first-line

/squadrons

(1) H.C. Debates, Vol. 335, cols. 1768-1770.

squadrons were still equipped with Furies, Harts, Hinds, Heyfords and Gauntlets - as in fact they were.(1) Earl Winterton admitted the charge on 12 May as regards one, at least, of these types, when he stated that "Hinds are being gradually replaced by more modern machines."(2) He did not reply to Sir Hugh Seely's specific question: "Can the Minister deny that there are only 28 Hurricanes in the service?"(3)

On 25 May, Mr. Dalton returned to the charge. There had been only "derisory deliveries" of Hurricanes, he said, though hundreds had been ordered, and up to a recent date not a single Spitfire had been delivered, though contracts had been placed in 1936.(4) Mr. Dalton made use in his speech of some of the figures quoted in a secret memorandum which had been circulated to members of the House and which, therefore, was not so secret after all. This memorandum alleged that our squadrons were still stocked up with Harts, Hinds, Furies and other out-of-date machines, all hopelessly outclassed by the aircraft of foreign Powers. It stated also that in our Air Force there was an absence or shortage of essential equipment of many kinds which other air forces possessed; cannons for fighters, bomb-racks, gun-rings and turrets, blind flying panels, direct action vacuum pumps, loop direction finding wireless aerials, Lorenz landing gear, etc. The tale of deficiencies was told in perhaps too sombre terms in some respects, but in substance it was, at that time, not too great an exaggeration of the true position.

Mr. Chamberlain attempted to explain the difficulties in his speech on 25 May. The conditions in which the air expansion was taking place were, he said, entirely exceptional. It "coincided with one of those forward leaps which periodically take place in applied science, and in this particular case the features of this advance took these forms: the development of the all-metal aeroplane, the design of new engines of unprecedented efficiency, and the invention of the variable pitch airscrew. The combination of these three new features in aircraft construction not only completely altered the design but it necessarily altered the strategy which had to be employed in the use of

/these

(1) H.C. Debates, Vol. 333, col. 344.
(2) H.C. Debates, Vol. 335, col. 1770.
(3) Ibid., Col. 1754.
(4) H.C. Debates, Vol. 336, col. 1241.

these newly developed machines."(1) He did not traverse Mr. Dalton's charges in detail; that he could not do so completely was evident, indeed, from one statement which he made - that the Spitfire would be "shortly coming into service".(2) Sir Kingsley Wood, too, in winding up the debate, confined himself to saying, "I obviously cannot reply to all the criticisms that have been made, but naturally I will undertake to examine them all carefully and to give consideration to them."(3)

Munich a Lucky Escape.

The Munich crisis occurred at the end of September, 1938. Much has been written in condemnation, much, but not so much, in defence of our Government's action at that time. There have been accusations of broken faith, of pusillaminity, of surrender to threatened force, of disgrace abounding in our highest counsels. All that need be said here is that, from the point of ciew of our air defence, it was extraordinarily lucky for us that we did not go to war just then. If we had done so, and if the Germans had at once launched an air attack on this country it is improbable that we should have won the antedated Battle of Britain that would then have had to be fought. "If there had been a war, though undoubtedly we should have won it", said Sir Archibald Sinclair on 17 November, 1938 "terrible injuries would have been inflicted upon the people of this country."(4) The German air force was practically as strong then as a year later, and we were very considerably weaker than we became by September, 1939. The Royal Air Force was simply not in a position to fight the Luftwaffe in the autumn of 1938.(5)

Our Air Strength in October, 1938.

On 25 October, 1938, Sir Kingsley Wood submitted to the Cabinet a paper which really left no doubt upon that point. It was a memorandum on "Relative Strengths and Proposals for the Improvement of This Country's

/Position

(1) Ibid., col. 1257.
(2) Ibid., col. 1259.
(3) Ibid., col. 1344.
(4) H.C. Debates, Vol. 341, col. 1186.
(5) At an Expansion Progress Meeting on 27 September, 1938, the Air Member for Supply and Organisation said: "We had during the past few years been building up a front line Air Force which was nothing but a façade. We had nothing in the way of reserves or organisation behind the front line with which to maintain it". (E.P.M. 137, page 9).

Position.(1) At page 10 there was an illuminating table of "Mobilizable Squadrons and Reserve of Aircraft and Crews", showing the position at five dates of which only two need be quoted here. The situation existing on the first of these, 1 October, 1938, is in itself conclusive evidence of our wisdom in not going to war at that time. The table contains a Note as follows: "Pending the full provision of reserve aircraft and crews, only a proportion of our first-line bomber squadrons are counted as mobilizable, the remainder being "rolled up" to find reserves of aircraft and crews. For the fighters, on the other hand, it is considered better to deploy the full first line at the outset, accepting a rapid and progressive diminution of the numbers that can be maintained in action." This explains why no reserves were shown in the table for the fighters at either of the two dates or for the bombers at the earlier date.

Fighters.

Date	Squadrons	First-line Aircraft	Reserves
1 October, 1938	29	406	Nil
1 August, 1939	36	576	Nil
Medium Bombers.			
1 October, 1938	31	372	Nil
1 August, 1939	20	320	Approximately 6 weeks' reserve of aircraft and personnel.
Heavy Bombers.			
1 October, 1938	10	120	Nil
1 August, 1939	14	168	Approximately 6 weeks' reserve of aircraft and personnel.

A footnote to the table states that of the 406 fighters mobilizable on 1 October, 1938, 238 were obsolete or obsolescent. In other words, only a little more than 40 per cent. of our fighters were really fit to be placed in the line. The position of the reserves was little short of catastrophic.

Indeed, the memorandum admitted that the state of the two Commands (Fighter and Bomber) in regard to equipment must continue to cause anxiety for some time to come. "The situation thus disclosed", it said, "though it

/shows

(1) C.P. 218 (38).

shows a progressive improvement over that obtaining today, will be definitely unsatisfactory throughout the next 12 months, particularly as regards fighters. We shall still be engaged in the re-equipment of our fighter squadrons with Hurricanes and Spitfires, in the production of which, particularly the Spitfire, there have been serious setbacks. The process of re-equipment inevitably means that until the first-line squadrons are fully equipped with the new type we cannot accumulate reserves, while the old types thrown up on re-equipment have to be used for training purposes."(1)

Sir Kingsley Wood went on to say that steps were being taken to improve the fighter position by re-arming, as a temporary measure, three squadrons with Blenheim medium bombers, fitted with six Browning guns. This greatly increased fire-power should make the Blenehims formidable fighters. At least seven more Blenheim squadrons would be provided with the necessary guns and fittings to enable them to be used in the alternative role of multigun fighters if they should be required. This could only be done at the expense of our counter-offensive, but the Air Staff agreed with the necessity for it until it had built up the minimum standard of fighter strength. The position would be further eased by the employment "in the more remote sectors of the fighter line" of five army co-operation squadrons which would be shortly equipped with an aircraft, the Lysander, of definite value as a two seater fighter.(2)

In the event, it will be seen later, the mobilised squadrons of Fighter Command did include Blenheims and Lysander squadrons, eight of the former and two of the latter. If not ideal fighters, they were at any rate an improvement upon some of the types that would have had to be used if the war had begun a year earlier. What the actual types were which would then have been available if war had come can be seen from the records of the Mobilisation Committee.

War Stations and Types in Autumn, 1938.

These records show the mobilisable squadrons, with their war stations and the aircraft to be assembled at each, at varying dates. Towards the end of August, 1938, the set-up was given as detailed below.

/There

(1) C.P. 218 (38), para. 40.

(2) Ibid., para. 41.

There were then, it should be explained, two Groups in Fighter Command - No. 11, with headquarters at Uxbridge, and No. 12, with headquarters at Hucknall. No. 13 Group, with headquarters at Newcastle, had not then been formed.

No. 11 Group comprised the following war stations and squadrons:-

Biggin Hill, 3 Gauntlet squadrons, 2 of which were to be re-equipped with Hurricanes in September - October.

Debden, 2 Hurricane squadrons (and one Demon for the Field Force).

Hornchurch, 2 Gladiator squadrons and 1 Gauntlet squadron; one of the Gladiator squadrons and the Gauntlet were to change to Spitfires in March and February, 1939.

Kenley, 1 Gladiator and 1 Gauntlet squadron, both to be re-equipped with Hurricanes in February, 1939, and 1 Demon squadron, to be re-equipped with Gladiators in February, 1939.

Northolt, 1 Gladiator and 1 Hurricane squadron.

North Weald, 1 Hurricane, 1 Gladiator, 1 Gauntlet squadron; the Gauntlet squadron was to be re-equipped with Hurricanes in December.

Tangmere, 2 Fury squadrons, to be re-equipped with Hurricanes in October - November.

No. 12 Group comprised the following war stations and squadrons:-

Catterick, 1 Fury squadron, to be re-equipped with Spitfires in December - January.

Church Fenton, 1 Gladiator squadron (with 1 Demon squadron for the Field Force).

Digby, 1 Hurricane and 1 Gauntlet squadron; the latter was to re-arm with Hurricanes in January.

Duxford, 1 Spitfire and 1 Gauntlet squadron; the Gauntlet was to become a Spitfire squadron also in October.

Usworth, 1 Demon squadron.

Wittering, 1 Gauntlet squadron, to change to Hurricanes in December (with 1 Demon squadron for the Field Force).[1]

There was thus in September, 1938, only a single Spitfire squadron in the Royal Air Force - No. 19 (Duxford). The other squadrons with the

/same

(1) Air Ministry file S.38466, Part III.

same war station was a Gauntlet and was to change to Spitfires in October. The Fury squadron at Catterick and two of the squadrons at Hornchurch were to be given Spitfires in January - March. As regards Hurricanes, 3 squadrons were already in possession of fighters of this type, and 9 others were to be similarly re-equipped in the near future. There were thus in actual being in September, 1938, only 6 modern fighter squadrons, though there would be 13 more in a few months' time - after which they would need some time to accustom themselves to their new machines. Otherwise, the fighters with which we should have had to meet an air invasion in October, 1938, were Gauntlets (9 squadrons), Gladiators (5 squadrons), Furies (3 squadrons) and Demons (2 squadrons). Looking at the set-up of Fighter Command at that time we cannot charge Mr. Churchill with under pessimism when he said, on 17 November, 1938, "the equipment of the Royal Air Force is deplorable".(1)

The condition of the equipment of Bomber Command was, for the particular purpose of defence against an air invasion, less immediately important, but actually in that Command in the autumn of 1938 the types were more up-to-date than were those in Fighter Command. There were 17 Battle squadrons, 10 of them being assigned to the Advanced Air Striking Force, 16 Blenheim (with 3 for the Field Force), 9 Whitley, 5 Harrow and 2 Wellesley squadrons. No Wellington squadron was yet in service, though 2 would be available in three or four months' time. 5 Hampden squadrons were also to be formed (in No. 5 Group), but they would not be mobilizable in full until the first quarter of 1939. The Command had also on its books a Hendon and 2 Heyford squadrons, but these were not considered to be mobilizable: a verdict which might well have been passed, one would have thought, on the 5 Harrow squadrons in No. 3 Group.(2)

Mobilizable Strength, September, 1939.

The improvement in the position during that year of respite is evident from a list of the squadrons which were mobilised in September, 1939. In Fighter Command they were:-

/16

(1) H.C. Debates, Vol. 341, col. 1138.

(2) S.38466, Part III.

16 Hurricane squadrons

10 Spitfire squadrons

8 Blenheim Fighter squadrons

4 Gladiator squadrons

2 Lysander squadrons

1 Hector squadron.

Two of the Blenheim and the Lysander[1] and Hector squadrons were borrowed from the Army co-operation allotment. They brought the total to 41 squadrons, as compared with the 27 which it was intended to mobilise a year before. Of the 41, 26 were Hurricane and Spitfire squadrons, that is, 20 more than at the earlier date.

In Bomber Command, 38 squadrons were mobilized, made up of:-

10 Battle squadrons

10 Blenheim squadrons

6 Whitley squadrons

6 Hampden squadrons

5 Wellington squadrons

1 Harrow squadron.[2]

All these except the Harrow could be accounted modern types, though the Battles were now obsolescent; and in any case it was not altogether satisfactory to find the medium bombers representing over 50 per cent. of the total. Actually, the 38 squadrons were only a part of the total establishment of the Command. Other squadrons were "rolled up" to supply reserves for those mobilised.[3]

The Absence of Four-engined Bombers.

It will be noted that in the lists quoted above there is no mention of the most characteristic British bombers of the war, the four-engined heavy bombers which were to play so great a part in our strategic air

/offensive

(1) At an Expansion Progress Meeting on 12 April, 1938, C.A.S. stated that the Lysander as a fighter would not be of use in the first line but could be used in the back areas. (E.P.M. 121, page 25).

(2) S.38466, Part III.

(3) Ibid. The same file shows that in addition to the 79 squadrons of Fighter and Bomber Commands, 5 flying boat and 11 other squadrons (mostly Ansons) were mobilised in Coastal Command, and 3 squadrons (all Lysander) in the Army Co-operation Group.

offensive. It had been expected a few years earlier that re-arming with the heavies would begin in June, 1939, but this opinion was declared by the Chief of the Air Staff (Sir Edward Ellington) to be "too optimistic".(1) That was at the end of 1936. In August, 1938, another forecast of the Air Staff contemplated their being ready for action by 31 March, 1940. In a table showing "Allocation of aircraft to squadrons by the end of 1939-40, Metropolitan Air Force", there appeared, along with Hampden, Wellington, Whitley, Harrow and Hereford squadrons -

4 Halifax squadrons

4 Manchester squadrons

2 Short B. 12/36 squadrons(2)

The last was the Stirling, which, with the Halifax and the Lancaster - the four-engined development of the two-engined Manchester - was to give a new meaning and to add a new terror to bombardment from the air. The decision to build such a bomber ranks with that made when the eight-gun Hurricane and Spitfire fighters were adopted amongst the happiest inspirations of the Air Staff in the preparation for the coming war in the air. The production of the heavy bomber did not begin in earnest until the winter of 1938-39. On 25 October, 1938, Sir Kingsley Wood informed the Cabinet that he proposed to start quantity production of them, working to a programme which would include 1,500 Manchesters, 1,500 Stirlings and 500 Halifaxes. He requested authority to place orders for half these numbers at a very early date.(3)

Specification B 12/36.

The first official suggestion of the modern four-engined bomber(4) was contained in a note of 28 April, 1936, prepared by the branch concerned in an Air Ministry file and circulated to the Directorates interested on 18 May, under the title "Air Staff Requirements for a four-engined Heavy

/Bomber,

(1) Minute by C.A.S. dated 21 December, 1936, in S.39676.

(2) Forecast dated 6 August, 1938, A.H.B. Folder V/5/II.

(3) C.P. 218 (38), paras. 30-32. A note at page 5 of the same paper shows that the three heavy bombers in question were 50 to 80 m.p.h. faster than the Blenehim and Battle, had a range (2000 miles) double that of the two latter, and could carry bomb-loads seven to ten times as great.

(4) A four-engined biplane bomber, the Handley Page V.1500, was built in the first world war but had not been in action, though ready, when the Armistice was signed.

Bomber landplane - Specification B 12/36". "The Air Staff", the note stated, "require a heavy bomber for world-wide use. It should be an aircraft that can exploit the alternatives between long range and very high bomb load which is made possible by catapult launching in an overloaded condition. The aircraft must possess high performance but at the same time be strong in defence in all planes. An aircraft fulfilling these requirements will probably be large but it should not exceed a span of 100 feet. In order to afford maximum reliability during and immediately after catapulting and also to be able to retain height with one engine out of action, the aircraft should be four-engined. Since it will be required to operate from bases anywhere in the world the aircraft must possess good facilities for maintenance in the open".(1)

The note then laid down the requirements in detail. They were that the speed at 15,000 feet must not be less than 230 miles per hour, and the range not less than 1,500 miles with 2,000 lb. bomb load and 500 yards take-off, or 2,000 miles with 4,000 lb. bomb load and 700 yards take-off; with accelerated take-off, it should be 3,000 miles with an 8,000 lb. bomb load. The note added: "It is hoped that a range of at least 2,000 miles will be attained when carrying the maximum possible load, i.e. 14,000 lb.". The 14,000 lb. load might consist alternatively of 28 500-lb. bombs, which would normally be used against land targets, or 7 2,000-lb. bombs, which would be used against ships or in special cases against fortifications and magazines. Such a weight would be possible only with accelerated take-off, and actually the idea of catapulting the heavy bombers was dropped during the building of them.(2) Power-operated turrets, mounting eight machine-guns in all, were to be fitted.

The proposal was considered by a Conference held at the Air Ministry on 27 May, 1936, under the chairmanship of the Deputy Chief of the Air Staff (Air Vice-Marshal C.L. Courtney). The heavy bomber was intended,

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(1) Note by O.R.1 in S.38417.

(2) S,38417, Pt. III. The Air Member for Development and Production stated at an Expansion Progress Meeting on 24 January, 1939: "Originally it had been intended that the Stirling should be capable of launching from a catapult, and although this requirement had been cancelled some time ago it had not been possible to take off all the additional structural weight which had been necessary to meet this requirement". (E.P.M. 151, page 18). That, perhaps, accounted in some measure for the comparative failure of the Stirling.

it was explained, to supplement, not to replace, the medium bomber, which would continue to be "the backbone of the striking force". Later, this policy was changed. In a minute dated 24 May, 1938 the Director of Organisation, Air Vice-Marshal C.F.A. Portal, stated: "Under Scheme L the tendency is for all bombers to become heavy bombers".(1) In 1936, however, a somewhat too optimistic view was held of the operational capabilities of such bombers as the Battle and the Blenheim. That is evident from a statement made at the Conference by the Air Member for Research and Development (Air Vice-Marshal W.R. Freeman); it would be better, he suggested, to have two smaller aircraft than one large one. Production and maintenance difficulties would be greater, it was also feared, with the bigger bomber. The general view, however, was that the latter justified itself by its capacity to carry large armour-piercing bombs and to mount a stronger defensive armament. After some incidental questions had been dealt with the proposal was submitted to the Chief of Staff (Sir Edward Ellington) and approved by him on 12 June, 1936.(2)

The "statement of requirements" was accordingly issued on 9 July, 1936, to the four manufacturers who were considered most likely to be able to fulfil them. They were: Sir W.G. Armstrong Whitworth Aircraft Ltd., of Coventry; Vickers (Aviation) Ltd., of Weybridge; Handley Page Ltd., of Cricklewood; and Boulton Paul Aircraft Ltd., of Norwich. They were informed that a specification embodying the requirements would be sent to them at an early date with an invitation to tender for the supply of one aeroplane. When the file was passed to O.R.1., Squadron Leader O.R. Gayford of that Branch suggested, in a minute dated 13 July, 1936, that Messrs. Short (the builders of the Empire flying boat) should also be asked to tender; they had a design for a heavy bomber which came very near

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(1) S.37626. The question of heavy versus medium bombers was still not finally settled in the summer of 1939. At an Expansion Progress Meeting on 4 July, 1939, the A.M.D.P. suggested that bombing operations should be carried out from France, in view of the loss of performance shown by revised estimates of the bomb-loads of the heavy bombers, and the A.M.S.O. suggested that the required bomb carrying capacity be attained by the use of a greater number of medium bombers. The big bombers required almost the same amount of personnel and could only operate from proper tracks. The decision in favour of heavy bombers was, however, maintained. (E.P.M. 174, p.5).

(2) S.38147, Pt. III.

to the requirement, he said, and had ample drawing staff to enable them to undertake such an order, while their amalgamation with Harland and Wolff would give them facilities for production in Northern Ireland. A similar letter to that sent to the other four firms was accordingly despatched to Short Bros. (Rochester and Bedford) Ltd., on 18 July, 1936.(1) The Short Stirling was thus, in a way, the outcome of a departmental afterthought.

The preliminary design of a four-engined bomber of the B.12/36 type was also sent in by the Supermarine Company and was considered to be the best submitted. It had not reached a sufficiently advanced stage, however, by the time of the death of the designer, Mr. R.J. Mitchell, in 1937, and no production order for it was given.(2) Two other heavy bombers, as well as the Short Stirling, were ordered, though not to the same specification. One was the twin-engined Manchester, which Messrs. Avro built to specification P.13/36 and from which the famous four-engined Lancaster was developed after the war had begun. The other was the Handley Page Halifax, which also started life in the design stage as a twin-engined bomber to specification P.13/36 but was changed before manufacture had begun into a four-engined bomber. Actually, there was not much difference between the B.12/36 and the P.13/36 four-engined machines.(3)

Our Stolen March.

We stole a march upon the Germans when we ordered these big machines. We hoped they would not hear of what we were doing and follow our lead. In a paper submitted to the Cabinet on 25 October, 1938, Sir Kingsley Wood said: "So far as we know, the Germans do not at present intend to develop the very heavy type of bomber - a fact which underlines the need for preserving the utmost secrecy as to our intentions in this respect; it is, however, not impossible that they may, before the summer of 1941, re-equip at least a proportion of their striking force with aircraft of this type - particularly if they get any good indication of the performance of our own types now in course of development".(4)

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(1) S.38147, Pt. III.

(2) At the Expansion Progress Meeting on 3 February, 1938, the C.A.S. said that "he had ruled out the Vickers B.12/36 as unlikely to be ready in time". (E.P.M. 111, page 1).

(3) At the Meeting on 13 July, 1937, the C.A.S. stated that the four-engined P.13/36 and the B.12/36 would be very much alike, and the former would not really be a P.13/36. (E.P.M. 89, page 16).

(4) C.P. 218 (38), para. 52.

The Germans did, in fact, develop a four-engined bomber - the Focke-Wulf 200, or Kurier, which was the military version of the F.W. Condor liner. It was confined, however, to long-range reconnaissance, mine-laying and operations against shipping and was not used against land targets. Another heavy bomber, the Heinkel 177, which was developed at a later date, could also be reckoned a four-engined machine in so far as it had two Daimler - Benz power units each consisting of two DB 601 engines coupled together, each pair driving a single airscrew. It was never available in numbers.

The reason why the Germans did not follow our lead, of which they can hardly have been unaware,(1) was that their conception of the role of the air arm was different from ours. For them, it was, in essence, mobile artillery; for us, it was predominantly a strategic weapon. That was why, while we were building the heavy bombers, they were building machines like the Junkers 87's, the Stukas, whose mission it would be to co-operate closely with the armoured columns and by that combination to make the Blitzkrieg effective.

It was effective, undoubtedly, but only against an enemy who was comparatively weak in the air. When the Stukas came up against our Spitfires and Hurricanes in the Battle of Britain they were simply shot out of the sky.

The Spitfire and the Hurricane.

The Spitfire first emerged into history as the Supermarine F37/34, the Hurricane as the Hawker F36/34. Such were the reference numbers of the specifications to which they were built. A minute dated 1 May, 1935, by Squadron Leader (later Air Marshal Sir) Ralph S. Sorley in an Air Ministry file gives the official account of their origin.

"On Friday, 26 April, 1935", he wrote, "I saw at Supermarines a mock-up of a fighter which they are building to Specification 37/34 ... As designed it has every feature required by our latest specification 10/35(2) /with

(1) Especially after the prototype Stirling crashed on its trials on 4 May, 1939, and the fact was reported in the Press: See Daily Telegraph 5 May, 1939.

(2) This specification, issued in 1935 and containing the requirement of 6 or 8 guns as alternative armament, should strictly have superseded F.36 and F.37, issued in 1934. Actually, the two specifications of 1934 were modified to include the 8 gun requirement. It was Squadron Leader Sorley who, more than anyone else, was responsible for the introduction of the 8 gun fighter after its original and very ardent champion, Wing Commander A.T. Williams, died in 1934.

with the following differences:-

		37/34	10/35
(1)	Guns	4 in the wings	6 or 8 in the wings
(2)	Bombs	4 x 20	Nil
(3)	Fuel	94 gallons	66 gallons

"Mitchell received the Air Staff requirements for the 10/35 while I was there and is naturally desirous of bringing the aircraft now building into line with this specification. He says he can include 4 additional guns without trouble or delay. Hawkers also have a similar aircraft under construction to a similar sort of specification, 36/34, the mock-up of which we have seen. I suggest that we should likewise relate the requirement of this one to the 10/35. Both aircraft look to be excellent and in the hands of (the late R.J.) Mitchell and (Sydney) Camm I suggest they are likely to be successes. I say this because I foresee in those two aircraft the equipment we should aim at obtaining for new squadrons and re-equipping Bulldog squadrons in 1936 if we commence action now to make this possible."(1)

That was a sufficiently close forecast of the historical event which was to come. So sure was Squadron Leader Sorley of the merits of the proposed Supermarine and Hawker fighters that he suggested in the same minute that jigs and tools should be ordered for them at once, so that production could proceed while the prototypes were being completed and tested. The time was not ripe, however, for "ordering off the drawing board" and the Chief of the Air Staff found himself unable to approve this particular suggestion, though he did agree otherwise to the proposals submitted to him.

It should be added that the Hawker machine which had been built to specification F36/34 had two interrupter guns in the fuselage and two in the wings. The Director of Technical Development, Air Commodore R.H. Verney, suggested (in a minute dated 4 May, 1935) that a new set of wings should be designed and built for it with eight guns in them, the machine being meanwhile flight-tested with the original four guns. This proposal also was accepted and the building of the eight-gun fighters accordingly began.(2)

/To-day

(1) S.35617, Part I.

(2) Ibid.

To-day all the world knows what those fighters accomplished. In truth they saved the cause of freedom and civilisation when but for them the forces of evil and oppression would have prevailed. The Spitfire was probably the greatest fighter machine of the war. It endured, in many successive versions, right up to the close of hostilities. The Hurricane did not see the whole war through. It went out of production in August, 1944; but it lived on in its offspring - the Typhoon and the Tempest, both products of the Hawker firm. They have maintained the tradition which the Hurricane created.

Quality not Sacrificed to Quantity.

The facts about the introduction of the four-engined bomber and the eight-gun fighter are worth remembering when we are inclined to blame the Air Ministry or the aircraft industry, or both, for our failure to overtake Germany's lead in the air. We might have overtaken it if we had been prepared to sacrifice quality to quantity in our air expansion. The temptation to do so was strong in those days of almost frantic pre-occupation with the question of first-line strengths. We might have had an Air Force much larger than it was in 1939 if we had not decided, concurrently with the increase in numbers, to make the force qualitatively superior to Germany's. That was a wise decision. In the event, Germany had nothing as good as the Spitfire, the Hurricane, the Halifax and the Lancaster, in the years that mattered most for the winning of the war. It was fortunate indeed that air expansion was not allowed to be simply rush and hustle and nothing more. Some clear thinking by able men went to the planning and execution of it. For that we have reason to be profoundly thankful.

CHAPTER V

SHADOW AND OTHER FACTORIES

Pre-expansion Supply.

The pattern which our expansion took on the constructional side can be traced more easily if one starts with a clear understanding of the system of supply which was in force before the expansion began. In the absence of an explanation of the previous system a critic could be forgiven for ascribing to official incompetence or perversity various decisions, or failures to take decisions, which were natural enough, given the initial position, and were, indeed, the almost inevitable consequences of the prior system.

The system which prevailed before 1934 was one in which the Air Ministry looked to the aircraft industry both for the supply and, which was more important still, for the design of aircraft for the Royal Air Force. It was a different system from that adopted by the Admiralty. The Admiralty had a Royal Corps of Naval Constructors to whose designs warships were built either in the Royal Dockyards or in private yards. The Air Ministry had, and has, no similar organisation responsible for the design and construction of aircraft. The system of Government design and construction was tried in the early days of the Royal Flying Corps and was soon abandoned. It was tried in France, too, during the first wolrd-war and was a disastrous failure there. The better plan was found to be to entrust both design and production to the aircraft firms. That too, was the system in force in Germany, both during the former war and in the period of expansion preceding the second one. There, as here, design and construction were left to the industry.

The Importance of Design Staffs.

It is clear that such a system depends for its success on the possession by the aircraft firms of drawing offices staffed by men of the highest capacity. The designers are, in fact, the indispensable key-men of the whole process of supply. Because they are indispensable, the firms who employ them are indispensable also. If the firms went out of business the designers would go too.

The difficulty in the twenties and the early thirties was that the firms in question were always in danger of having to go out of business. There was hardly enough work for them to go round. They depended mainly on the contracts placed with them by the Air Ministry. They received orders for the equipping of foreign air services now and then, but the bulk of their work was that done for our own air force. That, in peace, did not amount to a great deal.

In a paper which Air Chief Marshal Sir Hugh Trenchard, Chief of the Air Staff, submitted to the Committee of Imperial Defence in July, 1922, proposing an increase in the Home Defence Air Force, he stated:- "If His Majesty's Government approve this scheme, it should prove of immediate assistance in reviving our moribund aircraft industry. The early placing of orders for new machines and engines will prevent firms whose engineering skill is an important asset of Imperial Defence from closing down, and it will be possible for them to keep in being design staffs, which are already in too many cases in process of disintegration".(1) Even with such increased orders, however, the aircraft firms had by no means an easy time, and some of them found it difficult to make both ends meet - as their shareholders knew but too well.

There had, in fact, to be a fairly severe measure of rationalisation if the aircraft industry was to survive. A number of the firms were of primary national importance, and the list of these came in time to be regarded as a select one to which the Air Ministry ordinarily confined its invitations to tender for service contracts. There were originally a little over twenty of such firms, four being manufacturers of aero engines and the rest constructors of aircraft. The number was slightly less when the expansion began. There were also a number of firms which made aircraft but not of military types. They catered rather for private owners, at home and abroad, and for the aero clubs and flying schools. The De Havilland Aircraft Company Ltd. was an example of this category of firms. It used to built military aircraft at one time - the D.H.2., the D.H.4. and the D.H.9 of the first world-war were famous machines of its

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(1) C.I.D. 11-A, July, 1922.

making. After the war it devoted itself entirely to constructing civil aircraft; the ubiquitous Moth was its best known product. After the second great war began it resumed the building of Service types with conspicuous success; the Mosquito was one of the outstanding light aircraft of the war.

The Air Ministry's Problem.

The Air Ministry's problem was how to keep the industry alive on the aeronautical rations that were available. A regime of open competition was impracticable; limited competition, too, was ruled out, for one or two firms on the list might have secured all the orders and the rest would have been left to starve and die. Those who were weaker financially could not have survived, and they were sometimes not the least valuable firms. The normal procedure for the placing of Government contracts was clearly not appropriate to the special circumstances of the supply of aircraft; nor was that the only difficulty which had to be surmounted.

In a letter dated 22 December, 1924,(1) the Air Council set forth the difficulties for the information of the Comptroller and Auditor General, who had enquired why competition was not resorted to in the placing of contracts for aircraft. The letter stated:-

"The principal factors governing the problem of aeronautical production since the Armistice and at the present time are the following:-

(1) The absence of any substantial demand for aircraft or aero-engines outside air force requirements.

(2) The novelty of aeronautical science resulting in:-

(a) Absence of a definite aeronautical tradition and technical practice, and

(b) Rapid modification of design.

(3) The greatly enhanced rapidity and volume of output which would be required in the event of a serious war".

The letter went on to say that it was definitely the opinion of the Air Council that better results could be secured by the freer activities of the design staffs of a number of private firms than by the creation of a

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(1) 525821/24, printed in the Air Services Appropriation Account, 1932.

permanent designing staff and constructional corps of Government aeronautical engineers. This, in turn, affected the question of the practicability of competition. "Design and experimental construction have to be paid for in one way or another". The best way to pay for them was to give an order to the firm for machines to the approved design which it had submitted. It was, further, the best way to ensure that provision was made for the needs of expansion in a sudden emergency.

The question was raised again by the Comptroller and Auditor General in December, 1933, and the Air Council replied to this in a letter dated 20 January, 1934.(1) It referred to the earlier letter, quoted above, and stated that the circumstances were still as there explained. Due regard, it added, must be paid to the necessity of adequately rewarding the firm successful in design. Competition at the contract stage was for that reason impolitic. There was, however, competition at the design stage. "There is, both in respect of aircraft and engines, the very keenest competition between the different firms in respect of design; and any system of supply which militated against this competition would not only destroy the present high standard of efficiency, but inevitably prove, in the event of war, a very false economy".

The Leisurely Procedure.

The actual procedure of purchase under the system described above was not an expeditious one. Anything from five to seven years might elapse between the date when the first enquiry was addressed to the firms and that at which the squadrons were in possession of their new operational aircraft. The firms were first asked to submit designs to the requirements stated by the Air Ministry. The best two or three of the designs were selected from those submitted, and an order was given for an experimental machine of each of these selected designs. The experimental machines were tested when they had been received, and again the best was selected and a contract for a small number of machines, usually six, of the favoured design was placed with the firm who had sent it in. On delivery, these machines were subjected to "development trials" in a squadron, and any

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(1) 294636/33, also printed in the Appropriation Account, 1932.

desired modifications and improvements were incorporated. Finally, a production order was placed, again with the designing firm. This lengthy procedure had necessarily to be short-circuited under the stress of expansion, and in 1936 it began to be the practice to "order off the drawingboard".(1)

The Professional Industry and the Expansion.

Naturally, and properly in the circumstances, the firms who had already been building aircraft for the Royal Air Force had the first call made upon them when the expansion began. They were able to supply the increased numbers of machines required under the two earliest schemes - A and C. In the Memorandum (dated 2 February,1938) accompanying the Air Estimates for 1938-39, Lord Swinton stated that when the expansion began it was decided that the basis of the large-scale supply of aircraft should be the firms of the aircraft industry which had been working in collaboration with the Air Ministry for the supply of airframes and engines during the pre-expansion period and had thus acquired a vast fund of design experience. They were encouraged to extend their works to meet Air Ministry orders, and the Air Ministry indemnified them against ultimate loss for the cost of any extensions which subsequent experience showed to have been required for expansion orders only. The Memorandum also stated that negotiations by aircraft firms with outside shipbuilding and engineering firms were encouraged, to ensure full utilisation of the available production capacity of the country.(2) Full use was made, too, of subcontracting, and the Air Ministry had placed direct orders with other firms which were in a position to manufacture types of aircraft needed. These were mainly training machines, but an order for Fury fighters was also given to General Aircraft Ltd., a firm not on the Air Ministry's normal tendering list.

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(1) Lord Swinton stated in the House of Lords on 17 November, 1936: "In many cases we have ordered off the drawing board". (H.L. Debates, Vol. 103, col. 169).

(2) The reference was to the arrangements made by Short Brothers of Rochester with Harland and Wolff Ltd., of Belfast, and by Blackburn Aircraft Ltd., of Brough, with William Denny & Bros. Ltd., of Dumbarton. These "marriages" were contracted in 1936. Lord Swinton referred to them in the House of Lords on 17 November, 1936, when he said: "I think these are very lawful unions and I believe their issue will be fruitful". (H.L. Debates, Vol. 103, col. 172).

Lord Weir and the Outside Firms.

It was the view of Lord Weir, who became the Air Ministry's adviser on production in 1935, that not only could the "family firms" grapple successfully with the constructional programme involved in Scheme C, but that there would be not enough work for even those firms after a time. At the Secretary of State's "progress meeting" on 2 July, 1935, he expressed the opinion that "there were already sufficient firms in the industry", and that at the end of the expansion programme "firms would have to adjust themselves to a lower rate of output". "There would ultimately be a shortage of orders and he thought it would be unwise to increase the number of firms".(1) A few weeks later Lord Weir stated that "further investigations had only served to confirm his view that the existing industry was sufficient for the expansion programme".(2) His view was accepted by Lord Swinton (Secretary of State) and the Air Council, whose Secretary (Sir C. Ll. Bullock) referred at a progress meeting, à propos of an enquiry by the B.S.A. Company, to "the common misconception that additional firms are required to cope with the expansion programme".(3)

It was a different matter when Scheme F, the third of the programme, was adopted. It then became clear that the professional aircraft industry would not be able to cope with the demands. This Scheme, the same Memorandum stated, required the provision of aircraft, engines and equipment on a scale substantially in excess of the maximum capacity of the industry. It was decided in these circumstances to make use in peace of the motor car manufacturing firms who were allocated to the Air Ministry for production in war. The adoption of this policy, it was added, served two purposes. It provided for production of that part of the war reserves of aircraft and engines which was beyond the capacity of

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(1) E.P.M. 2(8).

(2) E.P.M. 4(6), 23 July, 1935. Lord Weir's attitude to this question was influenced also by his view that "we could not turn over the manufacture of metal aircraft of present design to the motor industry, since it would be putting an impossible strain upon them". If we were to produce as many as 25,000 airframes a year in war, he held that we should have to have a design, partly perhaps of wooden construction, capable of easy production in quantity. (E.P.M. 14(9)).

(3) E.P.M. 5(ii), 30 July, 1935.

the aircraft industry, and it afforded useful training in such work to the firms who would be allocated to it in an emergency.

The Shadow Factories.

The reference just quoted was to the "Shadow Factory" scheme which had been brought into operation in the same year, 1936. The scheme was dealt with in a White Paper presented by the Secretary of State for Air (Lord Swinton) to Parliament in October, 1936, under the title "Note on the Policy of His Majesty's Government in relation to the Production of Aero-engines".(1) The main purpose of the White Paper was to defend the principle of the scheme as adopted in face of Lord Nuffield's opposition to it and his refusal to participate in it. Lord Nuffield's assistance in the expansion of the Air Force was not, in fact, obtained until after Sir Kingsley Wood had become Air Minister in May, 1938, when he agreed to organise a big factory for Spitfire fighters at Castle Bromwich. The White Paper, though largely taken up with the dispute with Lord Nuffield, also explained the origin of the scheme. Early in 1936, it stated, the Government approved a far larger programme of expansion for the Royal Air Force than that of the previous year. This decision was announced in the Statement relating to Defence issued on 3 March, 1936,(2) and envisaged both an increase in first-line strength and the building up of further large reserves of aircraft and engines.

The programme, it was explained, was too large for the existing aeroplane and aero-engine firms to handle. It happened that the type of engine required for this purpose was one manufactured by the Bristol Aeroplane Company, and the quickest and simplest course would ordinarily have been to arrange with that company to build and equip a new factory which would deliver the requisite number of engines. "As, however, a large part of the extra engines were required for reserve, the Government felt able to adopt the alternative of bringing in outside firms in the manner described below".

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(1) Cmd. 3295.

(2) Cmd. 5107.

The White Paper went on to explain that plans had already been made for earmarking the resources of a number of firms for different types of war production, naval, military, air and common. Under this allocation various motor firms were allocated to aircraft work. "The Government decided that it would serve the combined purposes of securing the additional airframes and engines which were required by the programme, of increasing the war potential, and of affording valuable experience to the firms allocated to aircraft if these firms would undertake the erection, equipment and management of a series of "Shadow" factories on behalf of the Government. Action was accordingly taken in regard to both aeroplanes and engines".(1)

"It was an essential part of the shadow plane for engines", said the White Paper, "that the shadwo factory should be established in the closest possible association with the works of the managing firm, which would in the event of war turn their main factories over to war production. The shadow factory so established would then in the most convenient manner carry out the work required during the present expansion, and would be best placed to be utilised by the firm immediately in the event of war".

Lord Swinton repeated and emphasised in a speech in the House of Lords on 17 November, 1936, the argument that the motor manufacturing firms had been brought into the scheme "strictly in accordance with the allocations of the war plan". "Each firm", he said, "is a firm which would turn over in time of war, I think, entirely to aircraft production".(2) The time factor, he stated, was not as important as it would have been if the engines were not intended as a war reserve, and therefore it was possible to take the opportunity of entrusting the construction of them to factories which had in each instance to be built from the ground up.

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(1) A further advantage was that the large motor manufacturers would not be likely to continue with their production of aircraft or engines after the expansion. It was made clear to them that they would receive no orders from the Air Ministry if they did. (E.P.M. 37, page 7, 28 April, 1936).

(2) H.L. Debates, Vol. 103, col. 173.

The Firms Selected.

The siting of the new factories in close proximity to the parent works had disadvantages as well as advantages. If it enabled the managing firm to undertake the supervision of the new factory with a minimum of interference with its own business, it was open to the objection that it involved added risks in war. Coventry and Birmingham, near which most of the shadow factories were established, were already centres of war production and therefore obvious targets for air attack. Decentralisation was not then, it seems, considered so important as it was at a later date. The danger that arose from having all our aero-engine eggs in too few baskets was pointed out by Lieut. Colonel Moore-Brabazon in the House of Commons on 15 March, 1937.(1)

The motor manufacturers originally selected were the Austin, Daimler, Rootes (Humber-Hillman-Commer), Rover, Singer, Standard and Wolseley companies. Of these the Singer and Wolseley companies fell out of the scheme before it was inaugurated, and their places were taken by the Bristol Aeroplane Company and the Austin Motor Company; these two firms agreed to divide between them the work of assembling the engines of which the parts were made by the participating firms. The Austin Company had thus a double role; it manufactured crankshafts and some other parts as one of the team making Mercury engines, and it assembled half of all the engines made.

It had, indeed, a third role: it was responsible for one of the two airframe factories established under the scheme. There were two such factories, building Battle and Blenheim bombers, and the Battle factory was erected close to the Austin motor works at Longbridge, Birmingham, as was also the new engine factory. The other airframe factory, for the construction of Blenheims, was established at Speke in Lancashire and was

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(1) H.C. Debates, Vol. 321, col. 1704. To overcome the difficulty of the shadow engine organisation being put out of action if a single factory were wrecked, it was decided at an Expansion Progress Meeting on 7 September, 1938, that duplicate sets of tools, etc. should be made and stored in the parent firm's works which would be turned over to aero-engine production in time of war. This arrangement meant that while "single line" manufacture would continue in peace, "double line" production would be introduced in an emergency. (E.P.M. 134, page 11).

managed by Rootes Securities, Ltd., who were also responsible for one of the engine factories under the scheme.(1)

The Battle Bomber.

It is always easy to be wise after the event, but it certainly seems in the retrospect that the selection of the Battle bomber as one of the two types to be manufactured under the shadow scheme was a mistake. The question was discussed at the Secretary of State's Progress Meeting on 6 February, 1936. The Chief of the Air Staff declared himself in favour of letting the shadow industry manufacture Battles - "it was a type which motor car firms could perfectly well turn out, and, being in existence already, they could actually examine it before committing themselves". Lord Weir suggested that the best arrangement might be to have one shadow firm for medium and another for heavy bombers. The Secretary of State "felt that there was something to be said for letting professional firms do all the heavy bombers, since the best conditions for shadow firm construction were that the aircraft should be small in size and required in large numbers".(2) The Secretary pointed out at the same meeting that "if heavy bombers were allocated to shadow firms their production would probably be very costly, owing to the special problems they presented".(3)

It seems, therefore, that the Battle was chosen for production under the shadow scheme because it was a more suitable machine than other possible selections for manufacture by a firm not previously engaged in the aircraft industry. It was a good choice, no doubt, from that point of view, but the fact remains that it was on the point of being superseded by types, already planned, of greater endurance, speed and carrying capacity. It is significant that on 21 December in the same year the Chief of the Air Staff (Sir Edward Ellington) directed that no more Battles

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(1) The Rootes engine factory was established at Coventry.

(2) 900 Battles were to be produced by the shadow industry.

(3) E.P.M. 25, 6 February, 1936. At a later Progress Meeting (on 5 January, 1937) it was suggested that the Austin shadow factory should produce B.12/36 four-engined bombers in combination with six other firms, but the idea was subsequently abandoned. (E.P.M. 64, page 11).

were to be ordered.(1) Eleven months later one finds the Air Member for Research and Development (Sir Wilfred Freeman) stating at a Progress Meeting (on 16 November, 1937) that "he could not help feeling we made a mistake in looking on the Battle, which was a single-engined type and could not carry a navigator, as a satisfactory aircraft for medium bomber duties, and that we ought not to perpetuate this mistake".(2) This really amounted to an admission that the Battles had never been suitable machines for the purpose for which they were intended and that the original selection of them for manufacture in quantity was a blunder.(3) They were never, in fact, a great success. They were murdered by the German fighters when employed with the Advanced Air Striking Force in 1940, and the losses then inflicted upon them led to their being relegated to the role of training aircraft. The Blenheims pulled their weight in the early part of the war, both as medium bombers and as night-fighters before the Beaufighters, also a Bristol product, became available.

The Mercury Engine.

Perhaps a similar criticism, though here the case for the decision taken was stronger, might be levelled against the selection of the Mercury VIII air-cooled engine as that to be manufactured under the shadow scheme. It was selected because it was the engine to be installed in the Blenheim and other aircraft, but it was already being superseded by newer engines of greater horse-power. The engine was, however, one which lent itself to the system of split manufacture, and that was the system which the firms participating in the scheme favoured. The White Paper already quoted states that Sir Herbert Austin and his colleagues were of opinion that "the

(1) S.39676. He had already stated at a Progress Meeting on 24 November, 1936, that for the purpose of the new expansion programme "types like the Battle could not be accepted". (E.P.M. 60(12)). Eight months later, on 20 July, 1937, C.A.S. stated that in view of the set-back in the Battle delivery programme, "a large number of aircraft of this type would be obsolescent by the time they were delivered". (E.P.M. 90(2)).

(2) E.P.M. 101, page 25. Later, an offer of Battles was made to the French Government but was declined. (E.P.M. 167, 9 May, 1939, page 27).

(3) Yet fresh orders for Battles were still being given after the war had begun. The C.A.S. objected, but it was decided that the orders should stand and the Battles be used as training machines. (E.P.M.186, 10 October, 1939, pp. 17-18).

"the only safe and practical scheme was for each firm to manufacture one section only", not, as the Air Ministry would have preferred, the whole engine.(1) They came to this conclusion partly because difficulty and delay would have been caused if the orders for jigs, fixtures, gauges, tools and other plants had all had to be duplicated, partly because the supervision of the Bristol company would have been subjected to increased strain if all the firms were making complete engines.(2)

Other Shadow Factories.

In addition to the airframe and engine factories, others were established for the manufacture of airscrews, carburettors and magnesium. They were all turning out their products by the end of 1938, some indeed by the end of 1937. Sir Kingsley Wood was able to state in the House of Commons on 9 March, 1939: "The eleven factories established under the shadow scheme are now in production". "There is a substantial output from the Government factories established in accordance with the policy announced in 1936", said the Memorandum accompanying the Air Estimates for 1939-40. "This is increasing rapidly".

The eleven shadow factories referred to in the preceding pages are those which were known by that name during the expansion, but actually there were others which were organised on similar lines and which might well have been given the same title. One was the factory which Lord Nuffield erected at Castle Bromwich in 1938 for the production of Spitfire fighters. It was an enormous factory, covering two and a half million square feet of floor-space and costing about four and a half million pounds sterling to construct. It is on official record that Lord Nuffield, remembering perhaps his dispute with Lord Swinton, expressed the desire that it should not be called a shadow factory.(3) The two outlying factories built at Crewe and at Glasgow, respectively, for the production of Merlin engines were also to all intents and purposes shadow factories. Indeed, Treasury approval was specifically sought in the Spring of 1938 for the establishment of "a shadow organisation for

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(1) Cmd. 5295, page 9.
(2) Ibid.
(3) E.P.M. 126, 31 May, 1938, page 3.

Rolls-Royce engine production as an insurance against the vulnerability of the firm's existing factory at Derby".(1) Messrs. Rolls-Royce were also opposed to the use of the term shadow factory in connection with the huge plant in Scotland,(2) but it is not clear whether the objection would have extended equally to the factory at Crewe. However, the name mattered little. The principle of the shadow scheme undoubtedly applied to both the Nuffield and the Rolls-Royce factories.

The Supply of Guns, Aviation Fuel, etc.

While the increasing of the production of airframes and engines was the main preoccupation of those responsible for the expansion of the Air Force, they had at the same time to provide for the manufacture of a wide variety of other essential supplies, on a scale far surpassing the peace requirements of the Service. Spare parts, for instance, had to be ordered in large quantities, as well as instruments and accessories of various sorts. Some of the equipment was of a kind not previously used by the Air Force. The cannon-gun was an example. It had been the policy of the Air Staff to rely on mutiple .303 inch machine-guns for the armament of fighters - a policy which was amply endorsed by the success of our fighters in the Battle of Britain. It was foreseen, however, that a heavier armament would have to be adopted in time, and that something bigger than the Vickers "K" gun and the Browning gun would have to be ordered. The cannon-gun selected was the 20-mm Hispano-Suiza, and after protracted negotiations with Prince Poniatowsky, the agent of the French firm who produced it, arrangements were made for the manufacture of this cannon at a factory at Grantham. The intention was that it should be used in the Westland fighter (which became the Whirlwind), not in the Spitfire or Hurricane. Actually, it was fitted in some of the two latter fighters in 1940, although machine-guns continued to be carried as standard armament.

Another question which involved lengthy negotiation was that of the supply of high octane petrol. By the use of 100 instead of 87 octane fuel the horse-power both for take-off and for cruising could be increased by 25

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(1) E.P.M. 119, 29 March, 1938, pages 22-24.
(2) E.P.M. 171, 15 June, 1938, page 25.

per cent. The commercial supply of petrol of such an octane value was, however, inadequate, and it became necessary to enter into contracts with three of the biggest oil producers for a large increase in their capacity for the production of it or of the Tetra-ethyl-lead which is an ingredient. The three companies were Imperial Chemical Industries, Trinidad Leaseholds, and the Shell Oil Company. The provision of tankage for the fuel when delivered was another matter for which special arrangements had to be made with the oil companies.

The supply of gun-turrets, of retractable under-carriages, of bomb-carriers, of bomb-sights, of bomb-cases, of balloons for the barrage, of hydrogen for inflating them, of cylinders for holding the hydrogen, of optical glass and instruments, of D.F. loops, of light alloy sheets, tubes and extrusions, of extrusion presses, of machine-tools, and of various other kinds of material or equipment had also to be organised and in some instances financed by the Air Ministry. Supplies of these and many other essential stores had to be provided both for use and as a reserve for war. In general, the Air Council had to take stock of its resources and probable requirements and to provide for the latter on a scale which far exceeded any provisioning programme ever yet attempted in the history of the Air Force.

The Outside Firms.

The decision to adopt the shadow factory scheme was not allowed to pass without challenge. It was attacked on the ground that in adopting it the Air Ministry was turning its back on the preferable plan of bringing the whole of the aircraft industry into the expansion effort. This view was put forward by Lord Sempill in a speech in the House of Lords on 17 December, 1936. He explained that since 1920 the Air Ministry's policy had been to divide the aircraft producing facilities in the country into two distinct categories - that of the approved and that of the unapproved firms. By a co-incidence there were 16 firms in each of these two categories. Lord Sempill's contention was that the Air Ministry, in failing to make use of the services of the unapproved firms, was neglecting a valuable source of supply. These firms, he said, were "left out in the

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cold". They should be brought into the drive for increased production, and the whole of the aircraft industry, not a part only, should be invited to participate. Except for a few orders for training machines, the position was that "we have a substantial part of the aircraft industry, the unapproved firms, with an adequate capital of £5,000,000 sterling, being thwarted in their efforts to get work from the Air Ministry".(1)

Lord Swinton's reply made short shrift of Lord Sempill's suggestion. He made it unmistakably clear that he had no use for it at all. He referred rather contemptuously to "the interesting essay which was read to the House by the noble Lord who moved this motion". He preferred the shadow scheme. It had the support of great industrialists like Lord Weir and Lord Hirst, whose advice had to be set against "the homilies of the noble Lord who moved the motion". In fact, Lord Sempill was proposing a plan which was not wanted. "It is no satisfaction to me to be offered bits and pieces which we do not want". "Does he (Lord Sempill) really suggest that certain firms which he talked about, small firms, have a greater production experience than vast motor manufacturing companies like the Austin, Standard, Daimler, Humber people who are in the shadow scheme?"(2)

Nevertheless, despite this castigation, the champions of the outside aircraft firms continued to press their case. In the House of Commons on 15 March, 1937, Mr. Oliver Simmonds suggested that they were not being treated fairly by the Air Ministry. "There was definitely jealousy between the old industry and the new firms", he said, "for the very obvious reason that the old industry, for some twenty years, has been struggling against adversity, with small orders and small dividends in any year, and very frequently a loss. The industry was thus very alarmed to see a large number of new firms coming into the aircraft manufacturing industry, with the possibility of receiving substantial Air Ministry orders. The Air Ministry, I think very fairly to those companies which had sunk a lot of money in aircraft manufacture over the years, stood by the old industry; but I am afriad that that standing by the old industry ... has rather suggested an antagonism on the part of the Air Ministry towards this new industry".(3)

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(1) H.L. Debates, Vol. 103, cols. 975 -982.
(2) Ibid., cols. 995 - 999.
(3) H.C. Debates, Vol. 321, col. 1778.

A year later one finds another Member of Parliament, Mr. Garro Jones, charging the "old gang" of the aircraft industry with harbouring a selfish and, in the circumstances, unpatriotic opposition to the newcomers. "There is an enormous number of young and enterprising firms who have never had a chance", he said on 15 March, 1938. The approved forms, he alleged, were very successful in freezing out the unapproved firms.(1)

There was the further difficulty that the firms who held Air Ministry contracts were disinclined in some instances to allow the outside firms to assist them as sub-contractors. At a Progress Meeting on 27 November, 1936, Lord Swinton referred to "the unsatisfactory state of affairs in the industry on this question of sub-contracting", in so far as the established firms were not resorting to it to the fullest possible extent. The Secretary (Sir Donald Banks) stated that "this 'family' and 'non-family' issue constituted a very real danger, and we should be exposed to the risk of serious criticism if it came out that a 'non-family' firm had been obliged to stand off 200 men (as General Aircraft had) because a 'family' firm (in the same neighbourhood) would not use them as sub-contractors".(2)

Sir Kingsley Wood's Changes.

It is difficult to think that there was not some substance in these complaints, or that some way could not have been found for associating the outside firms with those who were employed under the constructional programmes. It was only when Sir Kingsley Wood became Secretary of State for Air in May, 1938, that the smaller firms, not only in the aircraft industry but in every industry which could help in the drive for production, were first fully utilised. On 7 March, 1940, he claimed in the House of Commons that the great increase in production which had been achieved was "due in no small measure to our having sought eighteen months or more ago - we were in fact the first to do so - the assistance of thousands of small firms who had suitable labour and plant available".(3)

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(1) H.C. Debates, Vol. 333, col. 315.
(2) E.P.M. 59 (2).
(3) H.C. Debates, Vol. 358, col. 601.

How widely the net was cast during Sir Kingsley Wood's administration was shown in an informative memorandum which he submitted to the Cabinet in October, 1938. It is clear from what he said in it that he did not share his predecessor's view of the ability of the professional industry, re-inforced by the shadow factories, to meet the increased demands for air equipment. In the memorandum accompanying the Air Estimates for 1938-39, Lord Swinton had spoken of the shadow scheme in enthusiastic terms. Sir Kingsley was more dubious about it. After pointing out that labour was the limiting factor in the acceleration of production, he said that "the professional aircraft industry, even when augmented by the shadow factories, although capable in its own judgment of meeting the demand would not in fact be able to make good its forecasts".(1)

Sir Kingsley Wood then went on to enumerate the measures which had been taken to supplement the efforts of the aircraft industry and the shadow factories. It would have been impracticable, he said, because of the delay and cost and other difficulties involved, to concentrate the whole of the required labour force at the assembly shops,(2) and so the principle was adopted of taking the work to the sources of labour by means of sub-contracting. Aircraft firms had been instructed to put out 35 per cent of their production as measured in man-hours to sub-contractors, and this was being done. "New organisations now being started for aircraft production by Vickers-Armstrong, Metropolitan-Vickers, and English Electric will carry this further and are being planned on the basis of central assembly shops fed by a flow of components from associated sub-contracting firms".(3)

"The production capacity of the aircraft industry itself", the memorandum continued, "is being further increased by large extension of the works of, e.g. Bristols, Glosters, A.V. Roe, Faireys and Short Bros., and

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(1) C.P. 218 (38), para. 19.

(2) Lord Weir's view had been that "it was better to take labour to the work than work to the labour". (E.P.M. 179, 4 August, 1939, page 4).

(3) C.P. 218 (38), para. 20. The extension of the works of the English Electric Company was justified, it was decided at an Expansion Progress Meeting on 11 January, 1939, on the ground that an alternative source of supply of Handley Page aircraft would thus be provided in a safer area than Cricklewood, which was liable to be bombed. (E.P.M. 148, page 18).

the industry is being further strengthened by association with some of the principal engineering organisations, e.g., Short Bros. with Harlands, Blackburn with Denny, Westlands with John Brown, and by the control of Vickers Aviation and Supermarines by Vickers-Armstrong. Some of these steps are very recent. Involving, as they do, at least the provision of new assembly shops, the manufacture and installation of jigs and tools, and the setting in motion of a whole chain of sub-contractors, they cannot be expected to give effective production in less than 18 months".(1)

"Concurrently with the extension of airframe production", it was next stated, "steps have been taken to extend the capacity for the manufacture of engines, various components and accessories, and of armament equipment. The erection of new engine works to supplement the capacity of Rolls-Royce and of new factories for the manufacture of carburettors and airscrews, the organisation of quantity production of automatic pilots by Metro-Vickers and of Browning machine-guns by B.S.A. are examples of what has been done. Similar action has been taken to provide capacity for the production of materials with a view to securing additional sources of supply and fabrication".(2)

The Group System.

Finally, it was added, arrangements were being made to associate firms into a number of "production groups" and to limit the number of aircraft to be produced. Group A would build Manchester bombers and would include as its principal firms A.V. Roe, Fairey, Rootes and Metropolitan-Vickers, with associated groups of sub-contractors in the Liverpool-Manchester-Crewe area. Group B would manufacture Stirlings and Group C Halifaxes. Group D would build fighters, with the Hawker (including Glosters), Supermarine, Westland and Nuffield organisations as its principal members and an area in the south of England and the Midlands. Smaller groups would be created to undertake other types of aircraft. Firms which could not be brought into the group form of organisation would continue, with other sub-contractors, as separate manufacturing units.

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(1) ~~Ibid, para. 22.~~ C.P. 218(38), para. 22

(2) Ibid., para. 23.

Sir Kingsley Wood gave some further particulars about the group system of production in his speech introducing the Air Estimates in the House of Commons on 9 March, 1939. It had the double object, he said, of reducing the number of designs in service and of facilitating economical and rapid production. "The organisation of the aircraft industry on this basis will, I think, facilitate large-scale planning and ordering, and it will have the advantage of lessening the volume of technical work through all the stages of design, maintenance, store-holding and equipment throughout the service. It will also - and this is most important - reduce the dislocation which might result in war time if for any reason one of the manufacturing units was unable to continue in production". It would embrace, he added, not only the firms in the aircraft industry but "the Government factories and the new factories which are being created by such firms as Metropolitan-Vickers".(1)

The Question of Mass-production.

It is evident from this statement, as well as from other statements and actions of the time, that by 1938 the policy of diffusing rather than concentrating manufacture was being followed to a greater extent than it had originally been. It was a wise policy in view of the liability of our centres of production to attack from the air. Material damage was, in fact, suffered by some of the plants in the Coventry and Birmingham areas in the raids of 1940-41, and a still greater measure of dispersal was carried out under Lord Beaverbrook's orders, at that time. The damage would have been much more serious but for the steps already taken in this direction under Sir Kingsley Wood's administration. Decentralisation of manufacture was dictated by geography. In this island it would have been unsafe to have depended on large centralised plants such as were established in the United States. There, the huge works erected by Henry Ford at Willow Run near Detroit and the comparable giant plants in other parts of the country were the natural consequence, again, of the geographical conditions. There was no risk there of attack from the air, and in any event the genius of American industry tends always to the colossal. We in this country do

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(1) H.C. Debates, Vol. 344, cols. 2391-2.

things on a smaller scale. There were other reasons, too, why mass-production was not practicable here. Some of them were explained by Lord Weir in a speech in the House of Lords on 12 May, 1938.

"The next suggestion", he said, "and it is a suggestion made by entirely sincere and well-intentioned critics, is that all could be well if only mass production methods were adopted, and that an expert in mass production should be placed at the Air Ministry to ensure the adoption of this principle. The motor car industry is generally cited as a comparable example ... The best short answer is that aircraft has not yet reached that stage of technical development of design which would justify anything like the full adoption of mass production methods and processes. The real foundation for very large-scale production methods does not lie so much in the methods themselves but in the extent to which production possibilities are embodied in the design of the product itself... Later on, when aircraft design becomes more conventional and progress in performance becomes less marked, then the production methods will more closely approximate to those of the motor car".(1)

Lord Weir's view was endorsed by Lord Trenchard in a speech in the Lords on 23 May, 1938. "If you look at what may be called the fantastic number of 30,000, 40,000 or 50,000 aircraft", he said, "they are bound to be divided up into at least eight different types. There cannot be less. How can you make mass production of 5,000 aeroplanes? You can make it for tablets of soap or motor cars, which are made in millions, but not for a few thousands. You can of course get quick production - I do not doubt much quicker production than we have had".(2)

The Priming of American Production.

The extraordinary achievements of the American aircraft industry were facilitated, it may legitimately be claimed, by the help which we gave it in starting its wheels turning in 1938-39. There seemed to be little prospect then that the United States itself would be at war in three years' time. When the Japanese aggression did occur in December, 1941, the

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(1) H.L. Debates, Vol. 108, cols. 1078-9.

(2) H.L. Debates, Vol. 109, col. 302.

American aircraft industry was, very fortunately, already in a position of reasonable preparedness. It was able to produce in 1942 and 1943 the air equipment which by the summer of 1944 entitled the United States Army Air Force to claim that it was the largest and most powerful in the world. We in this country laid the foundations of that eminence. The first suggestion of the purchase of American aircraft was made by Lord Swinton at a Progress Meeting on 29 September, 1936. He stated that "he had asked the Chief of the Air Staff to produce a plan for two or three squadrons each of American bomber and fighter aircraft within the next few months on the hypothesis that we were told to increase our first line strength very rapidly in the next 15 months, before the shadow industry had got into production". After some discussion it was decided at that meeting that the Douglas D.B.I bomber and the Seversky P.35 fighter would be the best types to order, and that discreet enquiries should be made about the possible purchase of them.(1) Later, however, it was decided to order other types. In June, 1938, the Air Ministry placed contracts in the United States for 200 North American Harvard training and 200 Lockheed Hudson reconnaissance aircraft, and these numbers were subsequently increased to 400 and 250 respectively.(2) There was a certain amount of criticism of the Government's action in thus going abroad for its purchases of aircraft, but on the whole the step was approved. Indeed, one Member of Parliament suggested, on 15 June, 1938, that we should place an order in Germany "in view of the very high-class military aircraft being produced there". When Sir Kingsley Wood replied that we had no further orders in contemplation, the Member asked: "Is Germany considered an enemy country then?"(3)

After war had begun in Europe, still larger contracts were placed in the United States by our Government, for a wide variety of machines. In reply to a question in the House of Commons on 22 May, 1940, Colonel Llewellin, the Parliamentary Secretary to the Ministry of Aircraft

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(1) E.P.M. 52(6).

(2) Sir Kingsley Wood in the House of Commons, 9 March, 1939. (H.C. Debates Vol. 344, col. 2394).

(3) H.C. debates, Vol. 337, col. 211.

Production, said: "Very large orders for up-to-date types have been placed in that country (the United States), and their delivery is being expedited to the utmost possible extent".(1) He declined for reasons of security to give more precise information about the machines that had been ordered in America. It became evident, however, from the communiqués and reports that we were obtaining from that country such types as Flying Fortress heavy bombers, Catalina flying boats, Maryland, Baltimore and Boston medium bombers and Tomahawk and Kittyhawk fighters. The manufacturers of all these types of aircraft - Glenn L. Martin of Baltimore, Douglas of Santa Monica, Cal., Consolidated, also of Santa Monica, Boeing of Seattle, Curtis of Buffalo - increased their capacity substantially in order to deal with our orders (paid for at that time without the aid of Lease-Lend) and for that reason were in a better position to cope with the still larger American contracts which followed. The service which we rendered to the American aircraft industry - and which it rendered to us - must not be ignored in any study of the constructional side of the expansion, not only of our own Air Force but of that of the United States.

Aircraft Production in the Dominions.

North of the 49th Parallel we helped to start the wheels of pre-war production, too. A technical mission headed by Air Commodore A.T. Harris (the subsequent chief of Bomber Command) left for the United States and Canada towards the end of April, 1938, on an exploratory quest. "The party", said Earl Winterton in the House of Commons on 26 April, 1938,

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(1) H.C. Debates, Vol. 361, col. 129. In reply to a supplementary question, Col. Llewellin stated that he would investigate the question of buying wholesale quantities of aeroplanes from Italy. Actually, a proposal to obtain Savoia three-engined bombers from Italy had been made before the war. It was considered at an Expansion Progress Meeting on 31 May, 1938, when the Secretary of State (Sir K. Wood) stated that he would discuss it with the Prime Minister (E.P.M. 126, page 10). He announced at the next meeting that the Prime Minister thought the proposal would be "bad politically". (E.P.M. 127, page 10). A later suggestion that Breda 88 aircraft should be obtained was not pursued (E.P.M. 128, 28 June, 1938, page 2). The purchase of aircraft from Italian firms was again discussed by the Air Council in November, 1939 (E.P.M. 189, 28 November, 1939, page 5) and it was decided to order 400 Caproni CA.311 and 313 aircraft as trainers (E.P.M. 193, 30 January, 1940, page 8). None were, however, actually obtained and it was decided on 23 April, 1940, to abandon the Caproni order (E.P.M. 199, page 11).

"will investigate whether types of aircraft which might be suitable for certain Royal Air Force purposes are available for early delivery. They will also examine the capacity and potentialities for the production of aircraft in Canada".(1) This initial mission was followed by a second and more important one in the summer.

On 13 July, 1938, Sir Kingsley Wood stated in reply to a question in the House of Commons that His Majesty's Government had decided to send immediately a special mission to Canada for the purpose of entering into negotiation with the Canadian aircraft industry for the manufacture of large bomber aircraft there. The mission would be headed by Sir Hardman Lever, who would be accompanied by Marshal of the R.A.F. Sir Edward Ellington, Mr. F. Handley Page and Mr. A.H. Self of the Air Ministry.(2) On 16 November, 1938, Sir Kingsley Wood was able to inform the House that the negotiations in Canada had been successfully concluded. A new company had been formed called "Canadian Associated Aircraft Ltd.", to operate two new factories, at Montreal and Toronto, where aircraft components manufactured by six existing companies, which would increase their capacity, would be assembled. The six companies were the Canadian Car and Foundry Company, the National Steel Car Corporation, Canadian Vickers, Ottawa Car Manufacturing Company, Fleet Aircraft, and the Fairchild Aircraft Company. The aircraft selected for manufacture in Canada was the Hampden bomber.(3)

In the following January, Sir Hardman Lever headed a mission to Australia. He was accompanied by Air Marshal Sir Arthur Longmore, an Australian by birth, and Sir Donald Banks, the Permanent Under-Secretary of State at the Air Ministry. The Air Ministry, in making this announcement on

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(1) H.C. Debates, Vol. 335, col. 49.

(2) H.C. Debates, Vol. 338, col. 1321.

(3) H.C. Debates, Vol. 341, col. 869. At an Expansion Progress Meeting on 19 July, 1938, it was decided that a Hampden should be sent to Canada and reduced to parts and that the Canadian industry should be given an educational order for a number of Hampdens; later, the Halifax should be manufactured in Canada. (E.P.M. 132, page 8).

8 January, 1939, stated that the mission was going out "for the purpose of examining, in consultation with representatives of the Commonwealth Government, the possibility of the creation of further capacity for the production of aircraft in the Commonwealth and to propose a scheme for the consideration of both Governments". The immediate result was the placing of orders for the manufacture of Beaufort machines in the Commonwealth, and arrangements were also made for the production of other kinds of equipment. The Lever mission went on to New Zealand, where measures were put in hand for the manufacture of training machines by the De Havilland Company. In both Dominions the general effect of the visits was to direct and stimulate the local Governments' plans for the organising of aircraft production and to enable it to be developed along the most promising lines from the point of view of imperial defence.

Our Pre-War Effort.

Given the disabilities under which a democracy necessarily labours in preparing to defend itself against an authoritarian state, it is probable that neither we nor the United States could have done very much better than we did in organising our industrial effort before the war. Two things, however, might have been done by us at an earlier date than they were done. One, already referred to, was the prompter harnessing of the aircraft firms outside the closed circle to the pre-war drive for production. The other was the abandonment of the maxim "business as usual". It was not until the spring of 1938 that the principle of "No interference with the course of normal trade", which had heretofore governed our military preparations, was modified. On 12 March in that year Lord Swinton submitted to the Cabinet a Memorandum dealing with the measures necessary to carry out Scheme K, then under consideration. Scheme L, the accelerated version of Scheme K, was almost immediately substituted for it, and Lord Swinton's arguments thus acquired increased cogency.

It was most desirable, he stated, that as much as possible of the programme should be completed in the next two years. He proposed, therefore, that sufficient labour of the right kind should be made

available to enable all important factories working on the Air Ministry programme to work double shifts where that was possible. "I must point out", he added, "that this proposal does not simply mean increasing the personnel of factories engaged on aircraft and engines, but it must be applied through the whole range of armaments, instruments and equipment. Unless this be done, the programme would get hopelessly out of balance."(1) The Cabinet approved on 22 March the proposal for working double shifts.(2)

Something more than this would have been needed, however, and needed at an earlier date, if we were to have had any real hope of overtaking Germany's lead in the air. As already stated in Chapter III, the aim of the programme which alone might have enabled us to do so - Scheme J of 1937 - was in fact unattainable because the industry of this country had not been shifted into top gear. Probably it could not have been moved up all the way at that time; but it might have been possible to go into an intermediate gear instead of jogging along on the lowest, as we did. The real difficulty in the matter of aircraft production, as of everything else in our pre-war effort until almost the eleventh hour, was that we never came anywhere near acceptance of the maxim "guns before butter". We were afraid of it because it had a totalitarian ring. It is a good maxim, all the same, for a nation that is furbishing its weapons of war in face of a great peril.

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(1) C.P. 65 (38).

(2) Cab. 15 (38).

CHAPTER VI

EXPANSION OF PERSONNEL

The Datum Line.

The organizers of the expansion of 1934-39, as in the matter of providing the matériel, so in the matter of providing the personnel for the enlarged Force, built on the existing foundations. They found a certain system in force and, wisely, used it as the basis for the further progress that had become necessary. Indeed, there was no alternative course that was practicable in the circumstances. Ideally a different and more ambitious plan would better have achieved the object in view, but it was a plan which was impossible in the conditions which then existed in this country. Compulsory service, with all its concomitants, was quite out of the question in 1934.

The organization of the Air Force of 1934 was one which was in some respects similar to the organization of the other arms of the service but in which there were some features of a special kind. It was an organization by tiers or strata, the layers of which, though there was some amount of criss-crossing, varied with the gradations of whole-time and part-time service, or the permanent or temporary character of the air-soldiering performed. There was, first, the regular Air Force, which in itself was made up of two elements. One was the nucleus of the Force, the permanent element, composed of the long-service officers and airmen; the other was the temporary element, the short-service personnel gathered round the nucleus and destined, after the due period of service, to pass to the Reserve. The Reserve, so formed, represented yet another tier or stratum. Then there was the non-regular Air Force, corresponding broadly to the Territorial Army, and, like the Territorial Army, intended to merge with the regulars on embodiment. There was also, by 1939, the Royal Air Force Volunteer Reserve, which corresponded in some respects, but not wholly, with the Royal Naval Volunteer Reserve; it differed from the regular Reserve in that the members of it had not passed through the regular Air Force. It was a fused compound of these four elements which made up the Royal Air Force that went into battle with the Luftwaffe in the second world-

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war. So integral and complete was the amalgamation that the distinctions of peace-time between the component parts ceased to be discernible and the memory of them to have any significance. The work that had to be done, the perils that were faced, the renown that was won, were all shared alike by regular, reservist, auxiliary and volunteer.

The Short-Service System.

Flying is a young man's activity and in the earliest days after the first world-war it was recognised that the Air Force must be organised in such a way that only a proportion of the flying personnel could be offered a permanent career in the service. A large reserve was necessary for another reason also. As in American football, there had to be "stand-by's" on the touch-line. Casualties in air warfare are high. Replacement of wastage is an even greater problem for a personnel than for an equipment department. A missing bomber means the loss of one aircraft but quite possibly of six or eight men. It is therefore even more essential that there should be an ample reserve of pilots and air crews than that there should be a reserve of aircraft.

The solution of the problem thus presented was a revolutionary one, so far as the filling of the bulk of the commissioned ranks of an armed force was in question. There had long been in operation a system of short service for other ranks of the army, but it had not been applicable to officers. In 1919 it was decided to institute "short service commissions" in the Royal Air Force. Officers so commissioned served for a few years - four or five at first, six at a later date(1) - on the active list, followed by renewable periods of reserve service. (A system of medium service commissions, for ten years, was introduced in the Thirties). The short service entrants were trained at first by Royal Air Force instructors at the Flying Training Schools. In 1935 the system was changed and the elementary instruction was entrusted to civil flying schools, who received from the Air Ministry a fee for each entrant

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(1) The Air Council decided at an Expansion Progress Meeting on 11 January, 1939, that "subject to Treasury sanction, the period of service of Short Service Commissioned Officers should be increased from 4 to 6 years". (E.P.M. 149, page 7). The Treasury approved the proposal at once. (E.P.M. 150, 17 January, 1939, page 9).

trained, and only the advanced training was carried out at the F.T.S's. The short service system was completely successful. It solved the problem of manning the commissioned ranks. The short service officers formed at any given time the bulk of the officers of the Royal Air Force. The prevalent idea that, as in the peace-time Navy and Army, so in the peace-time Air Force the officers were (predominantly) long-service professionals, was to that extent ill founded. The Air Force was essentially a short service force. Its flyers were birds of passage.

The Tradesmen of the Air Force.

In the filling of the non-commissioned ranks the problem that presented itself was a different one. The core of it was the provision of specialised mechanics. Aircrews had also to be considered but the question related mainly to the recruitment of the highly skilled tradesmen needed for the servicing of the aircraft and engines of the Force. The best policy, it was decided, was to catch the recruit young and to train him specially for the work which he would have to do, and which in certain respects had no real counterpart in civil life. A school for apprentices was opened accordingly soon after the last war at Lord Rothschild's estate at Halton Park, which had been occupied by the Air Force during that war. The necessary barracks and technical buildings were erected and Halton became a technical training school for some 3,000 boys, who were given a three-years' course and emerged as probably the finest young air mechanics in any country. From this school there came year by year a body of men capable of performing the work assigned to "Group I" of the airmen of the service, that is, the work of the fitters, instrument makers, machine-tool setters and operators, metal workers, electricians, etc.(1) Later during the period of expansion, this source of supply was augmented by another which did not involve so lengthy a training. Boys were recruited and given a course of 12 to 18 months' duration, for the purpose of fitting them for the "Group II" trades - those of flight mechanics, armourers, etc. These trades were also filled by adults recruited from civil employment, and so were the lowest categories of airmen. The period of active service was usually a limited

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(1) Apprentices for the wireless and electrical trades were trained at a school at Cranwell, separate from the Cadet College.

one, followed by reserve service. The airmen who served 24 years for a pension were a minority.

The Growth of the Air Force, 1934-39.

The Air Force, thus recruited, numbered 31,000 officers and men in 1934. It had been more or less stabilised at about that strength for some years. The placid waters of "Vote A", which limits the establishment, were but little troubled even in the Estimates for 1935-36; they reflected the beginnings of expansion to the very modest extent of adding 2,000 to the strength provided for a year earlier. The figure of 33,000 was increased to 50,000 in the next year's Estimates (1936-37) and then to 55,000 in the Supplementary Estimate of March, 1937. The establishment was raised to 70,000 in the Estimates for 1937-38 and to 83,000 in those for 1938-39. The latter figure was thus 50,000 more than that taken in the Estimates for 1935-36. Actually, in the three years 1935 to 1938 some 4,500 pilots and 40,000 airmen and boys were taken into the Royal Air Force, an annual average of 1,500 pilots and 13,000 airmen and boys as compared with a typical pre-expansion entry of 300 pilots and 1,600 airmen.(1) The expansion was now well under way, and the figure taken in Vote A for 1938-39 had twice to be increased during the financial year - to 96,000 in July, 1938, and to 102,000 in February, 1939. The latter of the two Supplementary Estimates was presented only a week before the annual Estimates for 1939-40; Vote A in these provided for 118,000 officers and men, increased to 150,000 in a Supplementary Estimate of July, 1939. The actual strength of the Air Force on 1 September, 1939, was approximately 118,000, behind which stood reserves totalling about 45,000. The strength was thus, all told, five times as great at the close of the expansion as it had been at the beginning.

The Auxiliary Air Force.

Meanwhile, the Auxiliary Air Force was also increasing in stature. The history of the force was a curious one. It was created in 1934, along with the Special Reserve, under the Auxiliary Air Force and Air

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(1) Secretary of State's Memorandum accompanying the Air Estimates, 1938-39. The actual intake of airmen in 1938-39 - the last pre-war financial year - was 28,276. (E.P.M. 163, 4 April, 1939, page 10).

Force Reserve Act of that year. The two forces were modelled on the Territorial Army and the Special Reserve of the Army, formerly the Militia. The Special Reserve squadrons, the name of which was changed later to Cadre squadrons, contained a higher proportion - about one third - of regular personnel than did the Auxiliary units; they were eventually converted into Auxiliary units.

Under the Act of 1924 the members of both forces could be called out "to serve within the British Islands in defence of the British Islands against actual or apprehended attack"; and service "within the British Islands" was defined as including "any flight of which the points of departure and intended return are within the British Islands or the territorial waters thereof ... notwithstanding that the flight may in its course extend beyond these limits". Otherwise, as Mr. William Leach, Under-Secretary of State for Air, stated in the House of Commons on 21 May, 1924, when moving the second reading of the Bill, it gave no power to send any man abroad.(1)

As the provision quoted above indicates, the mon-regular air units were conceived originally as a home defence air force which would continue to be such though their members might occasionally venture beyond our tidewater line. Actually, they were all bomber squadrons at first and, truth to tell, were not very highly rated as such. The official view taken of them can be seen from such evidence as this:- The Air Staff, in computing the number of first-line aircraft needed to give us parity with France in 1932, reckoned 127 non-regular aircraft as the equivalent of only 43 regular aircraft, that is, in the proportion of three non-regular machines to one regular.(2) It is hardly necessary to say that the Auxiliaries themselves did not share this view of their capabilities; it would have been very bad for their morale if they had done so. They had no inferiority complex; very much the opposite. In fact, some of the squadrons were inclined to look down on the regulars, as the cavalry in the Army used

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(1) H.C. Debates, Vol. 173, col. 2239. Mr. Leach explained the scope of the Bill, as did also Lord Thomson at the second reading in the House of Lords on 12 March, 1924 (H.L. Debates, Vol. 56, cols. 928-30). The Bill was introduced in the Lords.

(2) Sir John Salmond's Memorandum of 31 December, 1931, C.P.10(32).

to look down on the infantry. Poetic justice would have expected such pride to end in a fall. There was no fall. The Auxiliary Air Force was as good in action as it thought it was. It "lost its amateur status", people said, when it shot down German raiders in the Firth of Forth area in October, 1939. It followed up these early successes by doing splendid work in the Battle of Britain. Three Auxiliary squadrons - No. 601 (County of London), No. 602 (City of Glasglow) and No. 603 (City of Edinburgh) were in the thick of that fight and destroyed hundreds of enemy aircraft. Later, the County of Middlesex squadron, No. 604, became the most famous of night-fighting units, first with Beaufighters, later with Mosquitoes. No. 605 (County of Warwick) squadron won no less renown with its Mosquitoes by day. The record of No. 609 (West Riding) squadron with its Typhoons has also been a highly-distinguished one, and so has that of No. 600 (City of London) with Beaufighters in the Mediterranean.

There had been eight Auxiliarysquadrons in 1934 - Nos. 600 to 608, 606 being a blank number. There were twenty by September, 1939. Of the added twelve only eight were new squadrons - Nos. 609 to 616. The other four were former Cadre (Special Reserve) squadrons, Nos. 500, 501, 502 and 504, which were converted in the interval into Auxiliary squadrons. The Auxiliary Air Force also acquired shortly before 1939 a number of Balloon squadrons which added very greatly to the strength of its personnel.(1) It numbered 23,000 officers and men on 1 October, 1939, as compared with a little over 1,000 at the beginning of 1934; of the 23,000, some 4,600 belonged to the flying squadrons and some 18,400 to the Balloon squadrons.

The Air Force Reserve.

The Reserve, it has been stated, was fed by the stream of officers and airmen who served for a few years with the regular Air Force and then returned to civil life, with an obligation to return to the active list when needed and meanwhile to carry out their regulated periods of training. Here, during the expansion, a difficulty arose. The

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(1) For the Balloon squadrons, see page 130, later.

adequacy of the Reserve depended on the maintenance of the steady flow, year in, year out, and that flow was interrupted when, as happended after 1934, it became the practice to retain on the active list personnel whose time would normally have expired. This slackening of the rate of replenishment was the cause of much concern to the Air Ministry.

It is curious how little attention is usually paid to the all-important question of the maintenance of the reserve of personnel. The need for a backing for the first-line strength in machines is commonly recognised, but the equally great need for a similar insurance against the wastage of aircrews is overlooked. A failure to make such provision may have as disastrous an effect upon a country's capacity to wage war in the air as would a shortage of machines. That, of course, was well understood at the Air Ministry. In a Memorandum which Sir Kingsley Wood submitted to the Cabinet on 25 October, 1938, he said:-

> "By the beginning of 1940 the limiting factor in the number of squadrons we can mobilise becomes the provision of trained crews instead of the production of aircraft. We are concentrating our efforts, in the first instance, on providing an adequate reserve of trained pilots behind the fighter squadrons, and these squadrons have been allotted the first call on our training organisation, both Regular and Reserve, with the object of matching the supply of reserve fighter aircraft as they become available with equivalent numbers of reserve fighter pilots."(1)

Later, Sir Kingsley Wood stated:

> "I must repeat that the limiting factor in our war strength by the end of next year will no longer be the supply of aircraft but the provision of crews to man them, particularly in the reserve. The problem of personnel, in relation to the very large-scale wastage which may occur in modern air warfare, will thus become of increasing importance as the aircraft situation improves."(2)

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(1) "Relative Air Strengths and Proposals for the Improvement of This Country's Position", C.P. 218 (38), para. 44.

(2) Ibid., para. 53.

The Royal Air Force Volunteer Reserve.

One of the measures designed to solve the problem had already then been taken: the organisation of the Royal Air Force Volunteer Reserve. The R.A.F.V.R. was a distinct brain-wave - a composite brain-wave, for a number of crania contributed to it. Perhaps the main credit should be assigned to Air Commodore A.W. Tedder, the Director of Training at the Air Ministry, later to be known to fame as Air Chief Marshal Sir Arthur Tedder. He took up the idea with enthusiasm and infused into it the breath of universality which it lacked at first. The first suggestion of two of the characteristic features of the scheme ultimately adopted - the aerodrome centres and the town centres - was made in a memorandum which Mr. W.L. Scott, of Secretariat Branch S.7 of the Air Ministry, submitted to the Air Member for Personnel on 20 February, 1936.(1) This memorandum, said Air Commodore Tedder in a minute dated 2 March, 1936, embodied principles which were in agreement with the trend of the discussions that had been proceeding during the past two months. He agreed in general with the proposals but was unable to concur in all of them. Mr. Scott had envisaged a "freely associated body of volunteers" who, said Air Commodore Tedder, were "apparently to have a discipline and tradition quite different from that of the regular Service". "I feel that while this idea may be based on the experience and traditions of the two older Services, it is quite inappropriate to our Service; moreover, any wide distinction between Regular and Reserve would be a most serious weakness to the real efficiency of the Service as a whole."(2)

Air Commodore Tedder's view was that the new Reserve must be built up into "a Citizen Air Force, as a real second line of defence behind and closely affiliated to the regular Service". Indeed, he seems to have contemplated as an ultimate aim a force of "Citizen" units behind the regular units, "each with its own squadron and flight commanders controlling their own training".(3) The Volunteer Reserve did not develop

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(1) A.M. file S.37628.

(2) Ibid.

(3) Memorandum on "R.A.F. Reserve", para. 16, appended to Air Commodore Tedder's minute of 2 March, 1936, in S.37628.

in such a way; if it had done so, we should have seen realised, for the air, Kipling's conception of the "Army of a Dream". The Volunteer Reserve remained a fluid reserve, not segmented into units of its own.

The Democratic Touch.

That the new Reserve should not be connected with the Auxiliary Air Force was common ground among the directors who discussed the question. "In the past", said Air Commodore Tedder, "the Territorial Army has depended on the Territorial Association. Recent experience suggests that these Associations, depending as they do largely on the country gentry, are - like the country gentry - moribund. In order to link the Air Force Reserve with the general public some form of associations is needed, but associations based on live and active interests. Such associations would necessarily have a geographical character but they should, I suggest, be based on the big industrial and commercial associations."(1)

There the key-note was struck. The new organisation was essentially a democratic one. It was designed to appeal, and it did appeal, to the young men of our cities, without any class distinctions. The Air Council, it was stated in the letter submitting the scheme to the Treasury, "propose to open the new force to the whole middle class in the widest sense of that term, namely, the complete range of the output of the public and the secondary schools". "In a force so recruited", the letter went on, "it would be inappropriate to grade the members on entry as officers or airmen according to their social class; entry will accordingly be on a common footing, as airman pilot or observer, and promotions to commissioned rank will be made at a later stage in accordance with the abilities for leadership actually displayed."(2)

The Start of the R.A.F.V.R.

All necessary approvals having been obtained, the new scheme was announced by the Air Ministry at the end of August, 1936. His Majesty, it was stated, had approved the constitution of a new reserve, to be called the

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(1) Memorandum on "R.A.F. Reserve", para. 14, ibid.

(2) A.M. letter to Treasury, dated 19 June, 1936, in S.37628. What the new reserve should be called was a matter of debate - whether Citizen Air Force, Royal Volunteer Air Force, Civil Division of the R.A.F., or Royal Air Force Volunteer Reserve. The last title was adopted.

Royal Air Force Volunteer Reserve, and the organisation of the pilots' section of it was being proceeded with at once. Those accepted would be men who had had no previous service with the regular Air Force and who would be taught to fly in their spare time. They would have to attend an annual flying course for a period of 15 days. All entries would be in the rank of airman pilot but there would be opportunities for promotion to commissioned rank. The scheme would come into effective operation early in 1937. Other classes would be added to the reserve later. The present members of the Air Force Reserve who entered from civil life would be afforded an opportunity to transfer to the new reserve.(1)

Actually a start was made with the training in April, 1937. The first centres to be used were the 13 civil flying schools at which the elementary flying training of the short-service entrants of the regular Air Force, as well as refresher courses for the ordinary Reserve, was already being carried out. It was hoped, said the Secretary of State's Memorandum accompanying the Air Estimates for 1937-38, that not less than 800 pilots would be entered in the Volunteer Reserve in 1937. That hope was fulfilled. In the Memorandum accompanying the following year's Estimates (1938-39) the Secretary of State was able to record that since April, 1937, over 1,000 pilots had been entered in the Volunteer Reserve; he added that 21 aerodrome centres were already in operation and that 12 more would be opened in 1938. Medical and equipment branches had also been formed and during 1938 a section would be formed to provide crews for aircraft, that is, observers, wireless operators and air gunners. By the time the next Estimates were presented (on 25 February, 1939) sections for administrative as well as medical and equipment officers, and for aircrews and technical ground trades had been added. The Secretary of State was able to state in his Memorandum for that year that the pilot strength of the Volunteer Reserve had increased to over 2,500. The target figure (800 a year for three years) set in 1936 was thus reached with a comfortable margin.

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(1) Air Ministry Order A.201, 27 August, 1936.

The R.A.F.V.R. in 1939.

By May, 1939, 35 aerodrome centres had been opened, and 27 more were to open in 1939-40.(1) By September, 1939, there were 42 aerodrome centres in operation. London, as the greatest recruiting centre, naturally had the lion's share of them; there were eight spread round its perimeter - at Woking, Hatfield, White Waltham, Hanworth, Gatwick, Gravesend, Redhill and Stapleford Abbots. Bristol had three - at Filton, Whitchurch and Weston-super-Mare. Birmingham had two - at Castle Bromwich and Elmdon; Manchester two also - at Barton and Ringway. 27 other towns had each one. The aerodrome centres were, as already stated, principally at the civil flying schools which were already in existence or which were set up in fresh places for the purpose of the scheme. A few were established by air transport firms, and some were at municipal aerodromes. There were one or two curious geographical juxtapositions as a result of southern firms venturing into unaccustomed fields. The aerodrome centre at West Hartlepool, for instance, was operated by Portsmouth, Southsea and Isle of Wight Aviation Ltd., and the Gloucester and Cheltenham centre by Surrey Flying Services Ltd.

The Length of Training.

The main weakness in the scheme was one which was inherent in any system of training so designed as not to interfere with the trainee's ordinary work. Spare-time instruction is necessarily rather slow-motion instruction; and here speed was the essence of the contract. Attention was drawn to this weakness in a memorandum submitted by Sir Kingsley Wood to the Cabinet on 25 October, 1938. He pointed out that the training of the Volunteer Reserve crews, and especially of the observers and wireless operators, was a difficult problem. "Keen as the volunteer reservists are, it is estimated that under the R.A.F.V.R. system, whereby the airman's training is limited to periodical attendance at town centres during the week and at aerodromes at week-ends, with a period of 14 days' training each year, the training occupies, on an optimistic estimate, a period from three to four times as long as that required for the continuous training which is a feature of those conscript forces with which our strength is being compared". Sir Kingsley Wood added that he was preparing a new scheme of Reserve enlistment

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(1) "Outline of Expansion Scheme M," S.D. 145, 15th May, 1939.

under which the reservist would join initially for a short period of continuous service for training, the inducement being a bonus and a retaining fee thereafter.(1)

The scheme referred to was one under which entrants would perform six months' continuous training on enlistment. It could only be a voluntary scheme so long as compulsory service was not in force; hence the necessity for an inducement. The position was different once the Military Training Act, 1939 had become law (it received the Royal Assent on 26 May, 1939), and the Air Ministry was then in a position to make the initial training compulsory.(2) The position changed again on 1 September, 1939, when the Royal Air Force Reserve, including the Volunteer Reserve, was called out for permanent service by the Royal Proclamation then issued. The mobilized reservists then came under the regulations applicable to the regular Air Force.(3)

The Civil Air Guard.

For the training of the Volunteer Reserve it was thought best, as stated above, to rely mainly upon the services of the civil flying schools which were already giving ab initio instruction to the short service entrants. The facilities afforded by the light aeroplane and other flying clubs were not utilised for this purpose. It was found possible a little later, however, to make use of the services of the clubs for the training of what was, in effect, a further reserve. This was the Civil Air Guard. In July, 1938, it was announced that such a Guard was to be organised. The object, it was stated, was to provide a body of men and

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(1) C.P. 218 (38), dated 25 October, 1938, para. 54.

(2) It did so in Air Ministry Order A.252/39, dated 5 July, 1939.

(3) See Air Ministry Order A.388/39, dated 16 September, 1939. The Volunteer Reservists were all mobilised at once on the outbreak of war but there were not sufficient training facilities for all of them and many had to be employed on ground duties while waiting for places in the Flying Training Schools. At an Expansion Progress Meeting on 14 November, 1939, the Air Member for Personnel stated that "the course of the war was largely to blame for the fact that the Volunteer Reservists had not been absorbed earlier into Service training, on the grounds that if there had been considerable losses in the early stages Volunteer Reserve personnel would have been employed on any duties required." (E.P.M. 188, page 23).

women with knowledge of flying to assist the Royal Air Force in time of emergency or to perform any other services in connection with aviation that might be required. It was controlled by a body of five commissioners, presided over by Lord Londonderry. The Civil Air Guard was a purely civil organisation, and no person who had undertaken a reserve liability in any of the three forces was eligible for membership. The Air Ministry agreed to pay the clubs certain grants-in-aid if they would form sections for the Civil Air Guard and would undertake to charge them specially favourable rates for training to the private pilot's standard.

Sir Kingsley Wood referred to the Civil Air Guard when he introduced the Air Estimates on 9 March, 1939. He said it would provide a reserve which in time of emergency would be able to serve in the Royal Air Force or to give help in other ways. "The Guard today", he said, "possesses some 1,400 members in possession of "A" licences and 3,800 who are undergoing flying training. It has recently been decided to organise the guard for service in case of emergency by classifying holders of "A" licences into three groups, according to their qualifications for different types of service. The first two comprise those who can serve as pilots, instructors, air observers, wireless operators and air gunners, and the third comprises men and women who may be suitable for employment as ferry pilots, as ambulance pilots and for general communication duties. Certain selected volunteers in the first two groups will receive more advanced training than the rest, and members who are unlikely to qualify for any of these classes will be encouraged to undertake other forms of national service. One of the advantages of this scheme is that it utilises the facilities provided by the flying clubs throughout the country for the training of pilots and air crews, thus lightening the task of the flying schools and providing a valuable addition to our training resources."(1)

Sir Kingsley Wood thus made it clear that, though civilians, the members of the first two groups of the Civil Air Guard constituted a de facto reserve of pilots and aircrews for the Air Force. He implied it again

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(1) H.C. Debates, Vol. 344, col. 2385. The division of the C.A.G. into the three classes referred to by Sir K. Wood was approved at an Expansion Progress Meeting on 23 November, 1938. (E.P.M. 144, page 21).

in a later passage when he said: "Categories A and B will be of definite value to the Royal Air Force, and Category C will certainly be useful as well.(1)

The Civil Air Guard did not survive the outbreak of war. On 29 August, 1939, the Commissioners announced that ab initio training for applicants over 32 years old(2) would cease. Those who had volunteered but were not yet entrolled, it was stated, "will doubtless desire to offer themselves for other forms of voluntary service". Many did, in fact, do so, either by transferring to the Volunteer Reserve or by joining the Air Transport Auxiliary which was organised for the ferrying of aircraft for the Royal Air Force.

The Commonwealth Air Training Scheme.

Whether the provision made in the various ways described above would have solved effectively the problem of the manning of the Air Force during the protracted war which followed the expansion of 1934-39 cannot be known with any certainty. That some supplementary measures were thought to be needed is evident from three steps which were taken by the Government, two of them after the outbreak of war and the other just before it. The two were the organization of the Commonwealth Air Training Scheme and of the Air Training Corps. The third was the formation of the Women's Auxiliary Air Force. Between them, these three measures, and especially the first, ensured that the needs of the Air Force on the personnel side should be amply met. There was never, in fact, any difficulty upon this score, as in other circumstances there might well have been - and as, in fact, there was in Germany in the later stages of the war, when many of the German airmen were of a decidedly inferior type.

The scheme, Sir Kingsley Wood stated in the House of Commons on 10 October, 1939, (3) was put forward by His Majesty's Government in the United Kingdom for the consideration of the Governments of Canada, Australia and New Zealand in the shape of an outline of arrangements for the rapid expansion on a co-operative basis of the training organisation for

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(1) H.C. Debates, Vol. 344, col. 2502.
(2) The upper age limit had been 50 years.
(3) H.C. Debates, Vol. 352, col. 182.

pilots, observers and air gunners required, first, for the considerable enlargement, and then for the maintenance on the enlarged basis, of the Air Forces of the respective countries". Training schools would be established and maintained in each of these Dominions,(1) and the advanced training would be concentrated in the main in Canada. "The undertaking", he said, "is one of great magnitude. Its development will result in a very great and rapid increase in the number of training schools, already large, and achieve an increased output of first-line pilots, observers and air-gunners which, combined with our home effort, will ensure that the greatly increased requirements of trained personnel are fully met. The aim, in short, is to achieve by co-operative effort Air Forces of overwhelming strength".(2)

The aim was achieved. The supply became so copious, indeed, that after nearly five years of war it was found to be in excess of the demand. On 18 July, 1944, the Air Ministry announced that "a proportion of the young men who have been accepted for aircrew duties in the Royal Air Force and who are now awaiting entry to training will be made available to the Ministry of Labour and National Service for service in the Army or for other forms of national service in connection with the prosecution of the war". "The increasing superiority which the Royal Air Force and the Dominion and Allied Air Forces have achieved over the enemy in the air at a lower casualty rate than had been estimated has resulted in a balance of potential air crews in excess of immediate needs; and the Air Council some months ago made certain reductions in the flying training organization and reduced the intake of personnel for air crew duties".(3) Happy is the administration which is thus in a position to allow recruits offered for its acceptance to be diverted to other employment.

Sir Archibald Sinclair announced in the House of Commons on 17 November, 1944, that the joint air training plan would not be continued /beyond

(1) Sir K. Wood explained that the Union of South Africa had preferred to make separate arrangements, but "the Union authorities intend to make their training as complete as possible and to expand their air forces to the fullest extent of their resources". (Ibid., col. 183). Southern Rhodesia also organised a training scheme.

(2) Ibid., col. 183.

(3) Air Ministry Bulletin No. 14747, dated 18 July, 1944.

beyond 31 March, 1945; skeleton training staffs and airfields would be retained, however, in case the war situation so developed as to make expansion again necessary. "It is because of the favourable war situation that the present step is now possible", he said. Training in South Africa and Southern Rhodesia would be considerably reduced at the same time. He added that arrangements had been made for the training of a certain number of air crews in Royal Canadian Air Force schools after 31 March, 1945.

The Air Training Corps.

The Air Training Corps was another development of the war-period: it was not established until January, 1941. It was built, however, on foundations which already existed, as the official announcement stated at the time. These were the Air Defence Cadet Corps, the air sections of the school Training Corps, and the University Air Squadrons. The first of these, the Cadet Corps, was composed of squadrons of boys of 15 to 18 years of age raised and administered by local committees under the auspices of the Air League of the British Empire. By the autumn of 1939 there were 133 such squadrons, officially recognised by the Air Ministry. The University Air Squadrons existed only at Oxford, Cambridge and London before the war, the third being a recent addition to the other two, which had provided many officers for the Air Force for some years. Under the scheme for the Air Training Corps similar squadrons were organised at other Universities in Great Britain and Northern Ireland. The scheme was designed to ensure an adequate flow of young men of the right standards for pilots and crews and for the technical trades of the Royal Air Force. It tapped a new source of supply and a large one - the 700,000 youths of 16 to 18 years of age who were still at school or were employed and from whom could be drawn a very valuable addition, after preliminary training, to the numbers available for service when the higher age had been reached.

The scheme was an immense success. By November, 1944, more than 140,000 ex-cadets were serving with the Royal Air Force, and over 200 decorations had been won by young men who had been cadets.(1)

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(1) Air Ministry Bulletin No. 16440, dated 24 November, 1944.

The Women's Auxiliary Air Force.

The Commonwealth Air Training scheme and the Air Training Corps, it has been stated above, were inaugurated only after the War began. The recruits whom the Air Force obtained from overseas under the former scheme had their predecessors during the period of the expansion. Young men from the Dominions and Colonies had been coming here in substantial numbers for some years, to join the Air Force. Some of them had already received their elementary flying training in a Dominion and could at once be posted to a Service squadron on arrival in Great Britain, returning after their period of short service had been completed to their own country. Others were merely medically boarded in the Dominion and performed all their training after their arrival in Great Britain.

- The relief thus afforded to our man-power was augmented, too, from a different source. This was the Women's Auxiliary Air Force, which came into existence only a couple of months before the war began. There had been a "Women's Royal Air Force" in 1918, but it disappeared after the Armistice, and no attempt was made to organise any similar body until the expansion was well-nigh completed. In July, 1938, the Auxiliary Territorial Service was established by the War Office, and the original intention was that it should serve the needs of the Air Force as well as the Army. 35 companies of it were in fact allotted to the Air Force.(1) In June, 1939, however, the separate women's organisation for the Air Force was established, and in the Supplementary Estimates presented on 11 July, 1939, a sum of £15,000 was taken under Vote 7 for the expenses of the "Women's Auxiliary Air Force". In the annual Estimates presented on 27 February, 1939, only £3,800 had been taken for the "Auxiliary Territorial Service". Such was the very small beginning of a service which was to grow in five years' time to a strength very nearly so great as that of the whole of the Royal Air Force, including reserves, at the beginning of the war.

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(1) Statement by Sir Kingsley Wood in the House of Commons, 9 March, 1939, H.C. Debates, Vol. 344, col. 2380. Lady Londonderry had suggested to the Air Ministry in November, 1938, that a Women's Flying School and a Technical Training School should be formed, to train pilots for ferry work etc., but the Air Council decided at that time to continue the policy of associating itself with the War Office in the organisation of the Women's Auxiliary Territorial Service. A reply was made to Lady Londonderry accordingly, and it was pointed out to her that women could enter Class II of the Civil Air Guard for training as pilots (E.P.M. 145, 29 November, 1938, page 15).

By September, 1939, 230 officers and 7,460 air-women had been enrolled in the W.A.A.F. In September, 1944, the total number was 170,000. The scope of the duties of the force had been enlarged, moreover, to an extent which no pre-war forecasts had ventured to suggest. Originally employed on the domestic duties then regarded as suitable for women, the members' services were utilised as time went on in work which it had been hitherto considered that only men could do. Short of serving as combatants - and they came fairly near doing that - they turned their hands to almost every kind of work in the Air Force. Beyond all question they rendered invaluable service in freeing men for other duties and thus relieving the pressure on our man-power, especially strained as the war progressed and became increasingly global.

The Balloon Squadrons.

Among the duties which the W.A.A.F. came in time to perform was the handling of the balloons which protected London and other centres of population from low-flying enemy bombers, and, at a later stage of the war, from flying bombs. In the Secretary of State's Memorandum accompanying the Air Estimates for 1937-38 it was stated that special units of the Auxiliary Air Force were to be created to operate a balloon barrage in connection with the defence scheme for the London area, that the work of organising it was proceeding, and that orders for the necessary balloons and equipment had been placed and deliveries were already being received. A little later Sir Thomas Inskip, Minister for Co-ordination of Defence, stated in the House of Commons (on 15 March, 1937) that there would be 10 squadrons on an auxiliary basis, each of 600 officers and men, 10 per cent being regular personnel.(1) It had already been announced (in reply to a question on 24 February, 1937) that the extension of the scheme to the provincial cities would be considered in the light of the experience gained at London.(2)

The Balloons and equipment were ready early in 1938 and recruiting for the new units then began.(3) In the "Statement relating to Defence" issued on 15 February, 1939,(4) it was stated that "the balloon barrage scheme,

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(1) H.C.Debates, Vol.321, col.1787.
(2) H.C.Debates, Vol.320, col.1995.
(3) Statement by Lt.-Col.Muirhead in House of Commons, 15 March, 1938, H.C.Debates, Vol.333, col.236.
(4) Cmd. 5944, para.55.

which was started last year, has now been extended to the provinces and comprises 47 squadrons. A separate Command has been formed for the administration and training of the units, although for operational purposes they remain under the control of the Air Officer Commanding-in-Chief, Fighter Command, who is responsible for defence as a whole".

By the autumn of 1938 the 10 Balloon squadrons for the protection of London had been formed. A year later there were, in addition, 7 squadrons in the Birmingham area, 5 in the Liverpool area, 3 for Manchester and district, 3 for Bristol and district, 3 for Hull, 2 each for Southampton, Portsmouth, Newcastle, Sheffield and Glasgow, and 1 each for Derby, Plymouth and Cardiff.(1)

The Observer Corps.

Mention must also be made of a body which, though no part of the Air Force, or of any of the Services, was a vital element of our system of defence against air attack. This was the Observer Corps whose duty it was to identify any aircraft which crossed our coasts and by passing on the information to enable the machinery of interception to be brought into operation without delay. Before radiolocation was developed the Observers' warnings were the first to be received of the approach of possible raiders, and even when a network of radar stations was in existence they still had the indispensable duty to perform of distinguishing between friend and foe. A large number of men, drawn from all ranks and callings, had been well trained for this duty by the time the war began. They were all civilians and all volunteers. Some were whole-time workers and were paid £3 for a 48-hour week. The remainder were part-time employees and received 1s.3d. an hour towards their expenses. At first the Observer Corps were recruited locally and controlled by the Home Office, through the Chief Constables of the Counties, the members being enrolled as special constables. When the war began the Air Ministry took over responsibility for the administration of the Corps. The operational control of it was assigned to the Air Officer Commanding-in-Chief, Fighter Command. It rendered valuable service in the

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(1) The total number, it will be noted, was 44. The squadrons were numbered 901 to 947, but three numbers - 937, 941 and 946 - were blanks.

Battle of Britain. In September, 1940, Sir Archibald Sinclair, Secretary of State for Air, sent the Corps a message in which he said: "By your vigilance and faithful devotion to duty you are making an indispensable contribution to the achievements of our fighter pilots. Their victories are your victories, too". A little later the King was pleased to approve the addition of the word "Royal" to the title of the Corps. It continued to render invaluable aid to the Air Force throughout the war.

By November, 1944, the strength of the Royal Observer Corps had increased to 32,500 in round figures, 9,200 of these being full-time employees. The former figure included 4,300 women and girls, of whom about 2,800 were full-time employees. The women observers were paid £2.16.6. a week for whole-time work (as compared with £4.0.6. for men) and 10d. an hour for part-time (1s.3d. for men). A uniform was also provided in each case. In addition to those employed on land, a number of observers were specially enrolled into the Royal Navy as "aircraft identifiers", with the rank of Petty Officer, in connection with the invasion of the Continent.(1)

Changes in Organisation.

The expansion of the Air Force, the increase in volume and complexity of its equipment, the tendency towards specialisation of function which accompanied that increase, and the foreseen need for a re-distribution of responsibilities to meet developments of operational techniques and methods, involved necessarily some changes in the organization of the Force. The most important of these was the creation in 1936 of three new operational Commands - Bomber, Fighter and Coastal, the former "Air Defence of Great Britain" being abolished. A Training Command was established at the same time; it was sub-divided subsequently into two Commands - for Flying Training and Technical Training. Two years later (1938) three further Commands were established - Maintenance, Balloon and Reserve. Maintenance Command was made responsible for the administration of all storage units and depots, and Reserve Command for the training of the Volunteer Reserve and for the control of the elementary flying schools at which the initial instruction of regular personnel was carried

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(1) Full particulars of the Royal Observer Corps were given in Air Ministry Paper No. 110, dated 22 November, 1944, presented to the Select Committee on National Expenditure.

out. Reference has already been made to Balloon Command. A further Command - Army Co-operation - was not established until more than a year after the war had begun. Before the war units intended for duty with the Army were organised in a Group under Fighter Command.

Another important change that took place during the expansion was the creation of a technical branch of the Royal Air Force. Previously the officers of the General Duties Branch had combined the roles of flying and technical officers.(1) It was only on 1 August, 1939, that a change was made in this respect. The Air Ministry then announced the formation of a branch of the Force for engineering, armament and signals duties. In a modern air force, with its necessarily complicated equipment, the announcement stated, it is not desirable or practicable to maintain a body of officers to discharge both the duties of first-rate pilots and those of highly skilled technicians. A technical branch was therefore to be formed and would be staffed in part by personnel already serving and in part by University graduates holding degrees in engineering or science, and by others who had had some years' experience in good engineering works. The new branch was divided into Engineers, Signals and Armament sections, to which were added at a later date Electrical Engineers and Airfield Construction sections. It became in time a very large branch and one to which our supremacy in the air was in no small measure due. Without its services, and those of the ground crews in the squadrons, the flying and fighting branch of the Air Force could not have continued to be the cutting edge of battle that it was.

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(1) At an Expansion Progress Meeting on 13 December, 1938, the Air Member for Personnel stated that "the present system under which General Duties officers, who had been trained for specialist work, spent only part of their career on specialist work, had proved unsatisfactory". (E.P.M. 147, page 19). The scheme for a technical branch was discussed by the Air Council at an Expansion Progress Meeting on 4 July, 1939, and approved. (E.P.M. 174, pages 10 - 14).

CHAPTER VII

DRANG NACH OSTEN

The Double Transformation.

The Royal Air Force, it has been explained in Chapter IV, underwent a remarkable transformation in the years 1934 - 39. (The change as compared with 1923, when the first expansion scheme was approved, was, of course, still more marked.) The modernisation of its equipment was more evident, naturally, a decade after 1934, for then types of aircraft far exceeding in size and performance those which were in service when the second expansion began had come into action in great numbers. But a second transformation, and a not less notable one, took place in those years. It was one which went far to change the familiar face of England.

England, not Britain as a whole, was its scene, for it was in the country south of the Tweed and east of the Severn that the great change was most clearly to be observed. In 1934 England was a green and pleasant land. By 1944 it was a grim smithy of war and a great armed camp ... Munition factories abounded, soldiers of a dozen nationalities had assembled within its bounds. Airmen of as many had mustered here, too. The change which it is desired to emphasize for the present purpose, however, is not so much that brought about by the emergence of a total war effort in all its manifestations, within a country which had known only a limited war effort in the past; it is the revolution (for it was no less) represented by the transformation of England, and more particularly of eastern England, into the greatest base of air warfare in the world.

The Stations of 1923.

To look at a map of eastern England, showing air bases, first as it was in 1923, or even in 1934, and then as it was in 1944, is to bring home to oneself the magnitude of the transformation. In 1923 the Royal Air Force had no aerodromes for operational squadrons in that part of the country, with the exception of one at Bircham Newton near King's Lynn, and another at Duxford, near Cambridge. Some others were projected in 1923. In the original plan of that year for a 52 - squadron Home Defence Force there was still, however, no provision for any air base in Yorkshire or

Lincolnshire. The 35 bombing squadrons contemplated in the scheme were to be located mainly in Oxfordshire, Gloucestershire, Hampshire and Wiltshire. There were to be three aerodromes in Norfolk and one in Suffolk. The 17 fighter squadrons were to be in the south, with no station north of Duxford.(1)

The Stations of 1934.

In 1934 the scene had changed a little, but still the direction in which our Air Force was facing was south, not east. By that time the Air Defence of Great Britain had been organised in three areas - two bombing and one fighting. It is significant that the bombing areas were the Western and the Central; there was no Eastern Area. The Western Area had its bomber squadrons at Andover, Boscombe Down and Worthy Down. It had two also elsewhere than in the west country - at Aldergrove in Ulster and at Manston in Kent; but these were non-regular (Special Reserve) squadrons and being in the nature of "militia" units were necessarily located in the districts from which they were recruited. The Central Area's stations were mainly in Oxfordshire (at Upper Heyford and Bicester) but it had two squadrons at Bircham Newton and one at Abingdon in Berkshire. There were also three Special Reserve squadrons administered by this Area; they were located at Filton and Hucknall.

Besides the five Special Reserve squadrons there were also eight squadrons of the Auxiliary Air Force, all bomber at that time. These were administered by a separate Group - No. 1 Air Defence Group. Each was the territorial air unit of a county or city - London (two squadrons), Edinburgh, Glasgow, Middlesex, Warwick, Durham and Yorkshire - and had its headquarters in the locality with which it was connected. Both these and the Special Reserve squadrons would have moved on mobilization to war stations at which they could best co-operate with the regular bomber squadrons.

In contrast with the two bombing Areas and the Air Defence Group, the fighting Area had its squadrons grouped round London. They were located in Essex (Hornchurch and Northweald), Kent (Biggin Hill and Hawkinge), Surrey (Kenley), Sussex (Tangmere) and Middlesex (Northolt).

/The

(1) C.I.D. 120 - A, 3 November, 1923.

The only aerodrome not in these counties was that at Duxford, in Cambridgeshire. Duxford, Hawkinge and Northolt each accommodated one squadron. The other five stations had each two squadrons.

The Implication of the Siting.

If evidence were needed that we had no notion, five years before the event, that we should be at war with Germany in 1939, it is to be found in the location of our regular bomber squadrons in 1934. The natural bases for an offensive against Germany, given the fact, which we were bound to assume, of the neutrality of the Low Countries, would have been Yorkshire, Lincolnshire, Norfolk and Suffolk. It was in fact from bases in these counties that we did conduct our strategic air offensive of 1940-45. Yet in all the broad acres of those four counties there was only a solitary aerodrome from which squadrons were to operate - that at Bircham Newton. The Auxiliary Air Force aerodrome at Thornaby was not an operational one, nor was that of the Cadet College at Cranwell or the Experimental Establishment at Martlesham. The four counties were, one might almost say, a demilitarised zone for the purpose of air warfare. They were conspicuously innocuous. They lost that good character subsequently. From them there set out, as the war progressed, the mighty flotillas of Bomber Command which tore the heart out of the industrial Reich.

Vote 4 of the Air Estimates.

How they lost their character, how eastern England became by degrees one of the most dangerous spots on the globe, bristling with air bases, can be traced in the pages of the Annual Air Estimates from 1935 to 1939. The Estimates are repellent compilations. No one in his senses would read them for entertainment. No one except the officials who prepare them really understand them. For anyone else to try to do so is to be bored or bewildered, or both. Yet if one gets beneath the skin of the things one finds that there are flesh and blood in them. There is history in them, statistical history, but history still. There is certainly the history of the creation of our air bases in the years of expansion. It is all set forth, for those who care to enquire, in Vote 4 of the Annual Estimates.

/Actually

Actually, one could follow the progress of the expansion by studying the other Votes also; for instance, Vote 3, which bears the cost of the aircraft, engines, arms and other equipment provided for the Air Force. In it one can see how the cost of material grew from £8½ million in the Estimates of 1933-34 to £143½ million in those of 1939-40, (including the Supplementary Estimate of July, 1939).(1) It is, however, with Vote 4 that this chapter is concerned - the Vote in which provision is made for the works and buildings of the Royal Air Force. It has an instructive story to tell.

The Estimates for 1935-36 were the first to reflect the Government's decision of July, 1934, to adopt the expansion programme known as Scheme A. The effect of that decision upon Vote 4 was not very disturbing; the estimate was increased by less than £1½ million over that of the previous year. In the Estimates for 1936-37 the provision in the Vote was £2½ million greater than that made in 1935, but still the sum taken for works and buildings was only £6¾ million, a comparatively moderate figure in the circumstances. It had to be increased, however, before the end of the financial year; in March, 1937, a Supplementary Estimate raised the total of Vote 4 to about £9½ million. Nearly double that amount was provided in the Estimates for 1937-38, when Vote 4 accounted for £18½ million. The next Estimates (1938-39) started Vote 4 with £16⅓ million, but this amount had twice to be increased (by Supplementary Estimates of July, 1938, and February, 1939), and the final figure for the Vote was £30¾ million. A still larger sum was found necessary in the Estimates for 1939-40, when the initial provision under Vote 4 was £49 million, increased to £65 million by a Supplementary Estimate of July, 1939. The works Vote was thus more than three times as large in 1939 as the entire cost of the whole air service had been in 1934 (£20,165,600).

A Tell-Tale Item.

Not only Vote 4 as a whole, but, perhaps still more significantly, some of the separate items of it have a story to tell of the preparation which we made to meet the coming storm. A nation that is expecting to have

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(1) Vote 3 for 1940-41 accounted for £340 millions out of a total Air Estimate of £554 millions (E.P.M. 194, 13 February, 1940, page 6). Only a token vote was actually taken.

to fight a war in the air will do one thing, if it is wise. It will lay up reserves to meet the inevitable wastage of air warfare. We began to do so in 1936-37; that, again, is the first year in which signs and tokens of the expansion are in this respect unmistakably to be observed. The Estimates for that year provided £400,000 for "Aircraft storage". Next year (1937-38) a sum of £6 million was appropriated for the same purpose. This became £8¾ million in the Estimates for 1938-39, under the heading (in Vote 4) of "Reserve storage" - which meant the same thing. Finally, in 1939-40, the huge sum of £17,300,000 was taken for this service. It was a service, be it noted, necessitated solely by the expected requirements of a major war. No provision of the kind had been made before 1936. In those earlier years all the reserve equipment which we had could be stored in odd corners of a few operational stations. The fact that in the three years 1937-1939 an enormous building programme, costing £32 million, had to be adopted to house the reserves is evidence of the extent of air expansion on the side of materiel during that period.

The Major Works Services.

Vote 4 tells one more than that. It shows that in those years we were not only accumulating slings and arrows on a scale never equalled in our history, but accumulating them to meet a menace from a certain quarter. Subhead B of the Vote gives each year, station by station, a list of major works services, each costing £2,500 or over. (Usually, the cost of each such service is enormously greater than £2,500). From this list one can learn what new stations are being built and what old ones are being enlarged or reconditioned. A study of the subhead for the years 1934-39 repays attention.

The first Estimates to follow the decision to expand were those of 1935-36. Vote 4B for that year contains a few pointers to events to come. Provision is made in it for a number of large building programmes, most of them towards the eastern side of England. One finds in the subhead a reference to a second big station - Marham - near King's Lynn, to keep Bircham Newton company; to two new stations in Suffolk (where the great one at Mildenhall was approaching completion) - Feltwell and Stradishall, the latter being then as yet unnamed; to two in Lincolnshire - Waddington and

Manby; and to one new station in Yorkshire - Church Fenton, also still unnamed at that time - and to a large extension of the existing station at Catterick. There was provision also for stations in other places which were not very far from the east coast, such as Cranfield on the Bedford - Bucks border and Harwell in Berkshire.

Next year (1936-37) Yorkshire figures more prominently in the list. One finds money taken in Vote 4B for new stations at Dishforth, Driffield and Leconfield in that county. Two new stations for Lincolnshire - Hemswell and Scampton - also make their appearance; and Huntingdon - another potential base for a bombing offensive across the North Sea - comes into the list with two also - at Upwood and Wyton. Debden in Essex is also to be found in this year's entries.

In the Estimates for 1937-38 more place-names now well known to the Royal Air Force appear for the first time. West Raynham and Watton, (Norfolk), Bassingbourn (Hertfordshire), Cottesmore (Rutland), Finningley (Yorkshire) and Wattisham (Suffolk) are in the list in Vote 4, where, as usual, the names of the stations begun in previous years are mostly still to be found. The particulars of cost shown against the old entries are, however, not the same. Almost invariably they are greater than before. The first estimate would be for, say, a third to a half a million sterling; the final estimate might well approach three-quarters of a million. The building of an aerodrome was always a rake's progress, financially.

Some stations cost far more than a million, but these were not operational stations. They were the big training schools and maintenance units (store depots), the names of a number of which appear in the Estimates for 1937-38 and 1938-39; Carlisle, Cosford (Staffordshire), St. Athan (Glamorgan), Quedgeley (Gloucestershire), Hartlebury (Wiltshire), Yatesbury (Wiltshire), Locking (Somerset), Heywood (Lancashire), Stafford, and Wroughton and Chilmark (Wiltshire).(1) St. Athan, which had a large

/School

(1) The Maintenance Units at Carlisle, Quedgeley, Hartlebury, Heywood and Stafford each had a floor space of 854,000 square feet, as compared with the 729,000 and 447,000 square feet of the pre-1934 store depots at Ruislip and Milton (S.B. 1254). The estimated cost of the five new depots ranged from £1,330,000 to £1,450,000 each. (S.40396). ~~S.40396).~~

School of Technical Training and two maintenance units, cost nearly two millions.

The drift to the east was to be discerned also in the Vote 4 estimate for 1939-40, where provision was made for Coltishall, Langham and two unnamed stations in Norfolk, Leeming and Topcliffe in Yorkshire, Binbrook and Kirton-in-Lindsay in Lincolnshire, Hatfield Woodhouse in Hertfordshire, and Newton in Nottinghamshire. There is to be noted also, however, an increasing reticence about the exact location of new stations. One item - No. 198 - of Vote 4B, for instance, contents itself with the rather uninformative entry:-

"New operational units:-

Station C	...	£750,000
Station D	...	£750,000
Station E	...	£750,000
Station F	...	£750,000
Station G	...	£750,000
Station H	...	£500,000

(What had become of Station A and Station B is not disclosed.) Another vague item was No. 192, "Miscellaneous air defence works, £3,270,000." The Committee of Supply would have jibbed in normal circumstances at such a lack of candour. As it was, the items went unchallenged. The coming war was already casting its shadow before and much that would have been brought into the light of day in previous years was allowed to lie hidden.

The Alignment of 1939.

Many of the new stations were still under construction in the autumn of 1939, but the number already completed was sufficient for the needs of our Air Force in the early months of the war. The alignment had become by that time very different from what it had been in 1934. Of the five Groups of Bomber Command,(1) four were now definitely facing the east. Group I had its stations in Oxfordshire, Berkshire and Wiltshire. Groups II and III had theirs in Norfolk (8 squadrons), Suffolk (7 squadrons), Huntingdon

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(1) Air Defence of Great Britain, which had existed in 1934, was broken up into Bomber, Fighter and Coastal Commands in 1936.

(4 squadrons) and Buckinghamshire (2 squadrons). No. IV Group had all its ten squadrons in Yorkshire. All No. V Group's six squadrons were in Lincolnshire. There were two squadrons in Rutland and two in Hertfordshire as well.

The fighter stations were still mainly in south-eastern England, and more especially on the perimeter of the greater London area, where North Weald, Hornchurch, Biggin Hill, Kenley (or Croydon en lieu) and Northolt still stood on guard, with Tangmere as an outer bastion. (The squadrons at Hawkinge were to move to Northolt on mobilization). But now there were fighter stations in the north and east also: at Digby in Lincolnshire, at Wittering in Northamptonshire, at Debden in Essex, as well as (still) at Duxford in Cambridgeshire, at Catterick and Church Fenton in Yorkshire, in addition to the non-operational stations of the Auxiliary Air Force squadrons[1] at Abbotsinch (for Glasgow), Turnhouse (for Edinburgh) and Usworth (for Durham). Less pronounced than in Bomber Command, there was still in Fighter Command a turning away of its front to face a peril from an easterly as well as a south-easterly direction.

The German Menace.

The new alignment was clear and significant. If before 1934 the idea that we should have to wage another war with Germany was far from our thoughts, the position was very different a few years after that date. The German menace had become an obsession. The "next war" about which people talked was a war with Germany and nobody else. She was the potential enemy against whom we were preparing to measure our strength. As the expansion progressed, it was evident that our Air Force was not only re-forming but re-forming on a new line. The line was one facing Germany. But no one in polite society alluded to the possibility of our starting from that line to bomb Germany. Such things were simply not said. In the House of Commons on 27 July, 1938, Mr. Fred Montague interjected a supplementary question into another referring to a civil air service: "If it will be possible by 1940 to carry 40 passengers to Berlin, will it also be possible to carry 40 bombs to Berlin?" The House was shocked. There were cries of "Withdraw". Later

/Mr. Montague

(1) The Auxiliary Air Force squadrons, which had been bomber in 1934, had become fighter in 1939.

Mr. Montague made the usual "personal explanation" and withdrew his question. It had been open, he admitted, to serious misunderstanding.(1) After this pretty bit of play-acting the matter was allowed to drop.

The Location of the Bomber Squadrons.

There is the clearest evidence in the official files that the lay-out of Bomber Command was related definitely and deliberately to one kind of apprehended war only - a war with Germany. That fact dictated the distribution of the squadrons under all the schemes of expansion. Under Scheme C it was decided to locate the heavy bombers in Yorkshire and East Anglia, the heavy-medium bombers in Lincolnshire, and the medium bombers behind the Fighter Zone in the Oxon - Beds - Hunts area. "One big factor in this lay-out was the effort to avoid, as far as possible, passing our own aircraft through the Fighter Zone at night", the Director of Organisation (Air Vice-Marshal C.F.A. Portal) stated in a minute dated 9 March, 1938.(2) A few of the medium squadrons had, however, to be located in East Anglia. When Scheme F was substituted for Scheme C no change was made for a time, but at the beginning of 1938 the distribution of the squadrons was reconsidered for the purpose of that scheme, regard being had also to the possible adoption of Scheme K.

In a letter dated 4 February, 1938, the Air Officer Commanding-in-Chief, Bomber Command (Sir Edgar Ludlow-Hewitt) submitted to the Air Ministry an important paper entitled: "An Appreciation of the Correct Disposition of Bomber Command in the light of War Plans". In this paper (para. 6) it was proposed that "the aircraft with the shortest range, i.e., the Blenheims and Battles, should be located at those aerodromes nearest the western frontier of Germany, while the longer-range and heavier types of aircraft should be located at more distant aerodromes". "The aerodromes in East Anglia and Kent", the paper went on, "are nearest Germany, and this would indicate the location of the Blenheim and Battle squadrons in these areas. As, however, the aerodromes in Kent are unavailable in peace time, we must locate at aerodromes further inland those squadrons which would otherwise be located in this area, and be prepared to move them forward to either Kent or the continent on the outbreak of war. The remaining areas,

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(1) H.C. Debates, Vol. 338, cols. 3100-1.

(2) S.43816.

i.e., Yorkshire, Lincolnshire, East Midlands and Oxfordshire, will then be available for the location of the heavier and longer-range aircraft. While the Yorkshire and Lincolnshire Groups are furthest from the German frontier, nevertheless long-range aircraft based in these areas are ideally situated for the penetration into Germany via the north of Holland. The East Midland area is particularly suitable as a base for long-range aircraft operating viâ either the northern or southern routes". The Oxfordshire area, it was added, was well protected but awkwardly situated in so much as aircraft operating from it would have to make a considerable detour to avoid the congested London area. "This (Oxfordshire) area is, therefore, suitable for the medium squadrons, which could move either to the continent or to Kent on the outbreak of war".(1)

The Chart of 1938.

The distribution proposed by Bomber Command had to be varied slightly on account of difficulties of accommodation. Heavy bomber stations had been built in East Anglia, and the medium bomber squadrons would have been over-hangared if located there, while the old medium bomber stations in the East Midlands would be under-hangared for the heavies. Air Vice-Marshal Portal, in his minute of 9 March, 1938, already quoted, summed up the position by saying that "our bomber stations have been laid down and built up to meet a definite plan given to the late D. of O. by the late D.C.A.S. The war tasks which the Air Staff have now given to the Bomber Command have led them to suggest a better lay-out, but they are unfortunately nearly three years too late. In any case the disadvantages under which the Bomber Command will have to work will only last for a few years until the Battles and Blenheims in the two East Anglian Groups are replaced with heavy types".(2) For the time, it was decided that the Bomber squadrons should be located as follows:-

Hampdens in Yorkshire
Whitleys in Lincolnshire
Harrows, Wellingtons and some Blenheims in Norfolk and Suffolk.
Other Blenheims in East Midlands
Battles in Oxfordshire.

/In

(1) S.43816, enclosure 1A.
(2) S.43816.

In the Air Ministry letter approving this lay-out it was stated that the necessity to move the Battle squadrons of No. 1 Group (Oxfordshire) forward on the outbreak of war was recognised, and that gun protection against hostile air attack would be provided for the aerodromes in East Anglia.(1) Whether the Battle Group would move to the continent would depend on conversations with the French and arrangements with the War Office. The whole discussion at that time, the distribution of squadrons, and the changes subsequently approved, all took it for granted that the war for which we were preparing would be with Germany.

A Decade's Progress.

The construction before zero hour of such a rampart of air bases as that which was raised within smell of the North Sea was a notable achievement, but it was hardly more than a beginning. All that was accomplished in this respect before the war was completely overshadowed by what was done thereafter. Indeed, during the first three or four years of the expansion period the progress was not very impressive. Before 1934 there had been 52 aerodromes in possession of the Royal Air Force in the United Kingdom.(2) That number had increased to 89 by May, 1938.(3) How greatly the pace was intensified after 1938 can be seen from the following figures of the number of sites the acquisition of which was begin in each of the years 1934 to 1943:-

Year	Number of sites which action was inaugurated to acquire in each year	
1934	5 sites	
1935	17 sites	
1936	18 sites	plus 3 Auxiliary Air Force aerodromes taken over.
1937	12 sites	plus 22 civil aerodromes taken over as Royal Air Force Volunteer Reserve Schools.

/1938

(1) Letter dated 28 April, 1938, enclosure 12A in S.43816.

(2) This figure was quoted in the Secretary of State's Memorandum accompanying the Air Estimates for 1937-38.

(3) Reply by Earl Winterton to a question in House of Commons, 4 May, 1938, H.C. Debates, Vol. 335, col. 876.

Year	Number of sites which action was inaugurated to acquire in each year	
1938	27 sites	plus 1 Auxiliary Air Force aerodrome and 14 civil aerodromes for R.A.F.V.R. taken over.
1939	63 sites	plus 10 civil aerodromes for R.A.F.V.R. taken over.
1940	126 sites	
1941	106 sites	
1942	91 sites	plus 20 Advanced Landing Grounds.
1943	3 sites	plus 2 Advanced Landing Grounds.(1)

The sites so acquired were not in all instances for our own Air Force. According to the "Geographical Index of R.A.F. Units" for September, 1944, there were by that time in the United Kingdom 432 stations, and of these 98 were stations of the United States Army Air Force; the number of aerodromes actually in use by American air squadrons was 94. The Bomber Command of the 8th United States Army Air Force and Bomber Command of the Royal Air Force divided between them the raid-launching sites of eastern England.

British and American Bases.

In Yorkshire and Lincolnshire there were 56 British bomber stations; there was no American station in Yorkshire and there were only two in Lincolnshire. Norfolk, Suffolk and Essex, on the other hand, were predominently American. The 8th Air Force had 46 bomber stations in these three countries and our Bomber Command 24. There was also a spill-over of American bases into Rutland, Nottinghamshire and Leicestershire. In an area comprising Cambridgeshire, Huntingdonshire, Northamptonshire, Bedfordshire

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(1) List furnished by F.5, Air Ministry, 4 October, 1944. The same story is told by the record of payments made for the sites in the years 1939 to 1943, due regard being had to the fact that there is inevitably a time-lag in such settlements. In a confidential report made by the Air Ministry to the Select Committee on National Expenditure, dated 24 March, 1944, the following figures were given of payments for requisitioned land and buildings, excluding claims negotiated on behalf of the Ministry of Aircraft Production:- 1939, £72,000; 1940, £608,000; 1941, £1,990,000; 1942, £2,918,000; 1943, £2,550,000. (Air Ministry Paper No. 106). The figures in question do not cover, of course, the cost of construction on the sites requisitioned.

and Hertfordshire the honours were easy; we and the Americans each had 13 bomber stations. The Americans had also a number of Troop Carrier stations, mainly in Berkshire.

The British fighter stations were mainly in the south-eastern part of England, but there were some also in the west and in the north. The majority were congregated in Essex, Kent, Surrey, Sussex and Hampshire. The American fighter bases were mostly in Norfolk, Suffolk and Cambridgeshire. Coastal Command of the Royal Air Force had its stations spread round our shores.

Besides the operational stations - bomber, fighter and coastal - there were also many others which necessarily had their own aerodromes. The "Geographical Index" already referred to lists the names of 43 Operational Training Units, 11 Advanced Flying Units, 18 Elementary Flying Schools, 7 Air Gunner Schools, 12 Armament Practice Camps, 7 Flying Instructors Schools and a variety of miscellaneous schools at which flying facilities had to be provided.(1) Then there were the six airports of R.A.F. Transport Command - Prestwick (Ayr), Hendon (Middlesex), St. Mawgan (Cornwall), Lyneham (Wiltshire), Valley (Anglesey) and Nutts Corner (Antrim).(2)

The Satellite Aerodromes.

The "Geographical Index" for September, 1944, also gives the names of 111 satellite aerodromes (not included in the figure of 432 stations quoted above). No such aerodromes existed when the expansion began in 1934. The provision of them was first suggested by the War Organization Committee of the Air Ministry on 12 March, 1936, when it recommended that

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(1) The miscellaneous schools included, e.g. The Armament School at Manby (Lincs), the two schools of Air Navigation at Jurby (I. of M.), the Central Navigation School at Shawbury (Shropshire), the Empire Test Pilots School at Boscombe Down (Wilts), the R.A.F. School of Army Co-Operation at Old Sarum (Wilts), the three Lancaster Finishing Schools at Hemswell (Lincs), Feltwell (Norfolk) and Syerston (Notts), etc.

(2) At the end of 1944 the Royal Air Force had possession of 600 airfields in the United Kingdom, 430 of these being airfields with hard permanent runways of concrete on tarmac. (Memo. on Post-War Airfield Policy by Secretary of State for Air, (R(45)19, dated 26 January, 1945).

"(a) satellite aerodromes should be prepared in peace;

(b) civil aerodromes should be used as far as possible to provide satellites, and where the civil aerodromes existed proposals for meeting the needs of each station individually, together with an estimate of cost, should be prepared;

(c) satellite aerodromes should conform as nearly as possible in size to the current requirements of Service aerodromes, and should be located within a distance of the parent station of 5 miles for fighters and 10 miles for bombers."(1)

The question of the provision of satellite aerodromes was discussed at an Expansion Meeting on 5 October, 1937, when approval was given in principle to proposals put forward by the Air Member for Supply and Organisation. These were that the 56 satellite landing grounds then estimated to be required for the purposes of Scheme F should be provided as follows:-

(1) 11 civil aerodromes which were suitably situated should be used.

(2) 2 further civil aerodromes should be made suitable by small extensions.

(3) The balance of 43 should be obtained by purchasing suitable land, grassing it, and then letting it as pasture. 10 sites had already been found and 33 more were to be located. The average cost of the sites was estimated at £23,000 each.(2)

The last of the recommendations of 12 March, 1936, was departed from at a later date, and many of the satellites were at a greater distance than 5 or 10 miles from their present aerodromes. Some stations had two satellites: the "Geographical Index" lists 17 which were thus doubly insured.(3) Two stations were trebly insured. They were Little Rissington

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(1) Air Ministry file S.37536.

(2) E.P.M. 95(4).

(3) The 17 were: Carlisle, Church Lawford (Warwick), Cranwell (Lincs.), Derby, Finningley (Yorks), Hemswell (Lincs), Hucknall (Notts), Kenley (Surrey), Kidlington (Oxon), Lossiemouth (Moray), Montrose (Angus), Netheravon (Wilts), Newton (Notts), South Cerney (Glos), Tangmere (Sussex), Ternhill (Salop) and Watchfield (Wilts). They were stations for Operational Training Units, Advanced Flying Units, and Flying Training Schools.

in Gloucestershire, and Wheaton Aston, in Staffordshire. The former, a station for an Advanced Flying Unit, had three satellites - at Chipping Norton, Windrush and Akerman Street; Wheaton Aston, a station for an Operational Training Unit, had satellites at Bridleway Gate, Perton and Tatenhill. 71 other stations had a single satellite each. There was no need for a satellite in areas which were plentifully sprinkled with operational aerodromes.

The Increased Elaboration.

In comparing the later with the earlier years one must remember that a change almost as great as that which accompanied the development of our aeronautical equipment after 1934 was to be noted also in the ground establishments. These were far larger and more elaborate at the end of the expansion than they had been at the beginning. Even before the war began it had been recognised that the accommodation which had sufficied previously was no longer adequate. It was for that reason that very little use was made of the aerodromes left over from the war of 1914-18 and abandoned after it, but still remaining in a passable condition. A few of them were reconditioned and taken into use again but these were the exceptions. "Even where such sites are still available", it was stated in the Secretary of State's Memorandum accompanying the Air Estimates of 1938-39, "they were not always suitable for modern requirements." Before the war there was usually only an apron of tarmac in front of the hangars; the runways were of grass, and the arrangements for dispersal and camouflage were primitive. In a few years after the war had begun the runways had become broad concrete avenues a mile to three miles long, and concrete perimeter tracks ran all round the aerodrome, too, while hard-standings and heavily concreted and well concealed dispersal points were also provided.(1) The increase in the weight and power of the machines that had come into use, and the necessity for operating in weather that would have made the old kind of aerodrome

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(1) Before the war it was feared that concrete runways would make it difficult to camouflage an aerodrome and consideration of provision of them was therefore deferred at an Expansion Progress Meeting on 21 February, 1939 (E.P.M. 156, page 17). Later, the difficulty about camouflage was discounted and steps were taken to provide runways at all fighter stations. (E.P.M. 159, 14 March, 1939, page 23).

unusable, led to the change - and horrified the farmers of the counties where the aerodromes were situated. It is disconcerting to find pavements planked down in the midst of good pasturage and tillage country.

Farmers' and Others' Objections.

It so happened that two of the counties in which a large number of aerodromes had to be sited were also two of the richest agricultural counties in England: Lincolnshire and Norfolk. There arose, consequently, a conflict of interests, both of them of national importance: food-production and defence. Perhaps there had been a mystic premonition of that conflict, perhaps an assurance that they were not irreconcileable, in Sir George Cayley's life-long absorption in the problem of flight, over a hundred years ago; for he was the owner of estates in those two counties. However that may be, the landowners and farmers who noted the encroachments of the Air Ministry upon their land were naturally disturbed and often vocal in their protests. It was alleged in the House of Commons that "some of the very best agricultural land in the country had been appropriated when there were other areas equally suitable".(1) Nor was it only from those who were concerned about our agriculture that the objections came.

As soon as the reality of the German menace was understood everyone was ready enough to accept inconveniences and even sacrifices. It was a different matter before 1938. Then the Government's principle was "business as usual", and if that was a good rule in the industrial sphere, it should be equally good, the agriculturist could claim, in his sphere. Why should not the farmer be allowed to carry on his stock-raising or ploughing or potato-growing as usual? Why, again, should the long-shore fishermen be deprived of their living because an air gunnery and bombing range came trepassing on their chosen haunts? There was usually a battle-royal when one of these coastal ranges was proposed. The amateur sailors who found themselves barred from their favourite beats were also up in arms. Disturbance of game was occasionally a cause of objection.

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(1) Mr. T. Williams in House of Commons, 21 June, 1939, H.C. Debates, Vol. 348, col. 2214.

So, in a particular case, was an apprehended threat to a colony of swans; the stoutest opposition was raised on this account to the siting of a bombing and air gunnery range near Chesil Bank in Dorset. (Actually the swans did not care; they rather liked the noise of the bombs and the machine-guns). There were all sorts of obstacles to be surmounted whenever the Department ventured into fresh fields and selected an aerodrome or a practice camp in a district which had previously been free from the sights and sounds of war.

Sir Philip Sassoon's Statement.

Sir Philip Sassoon referred to some of the difficulties when he introduced the Air Estimates on 15 March, 1937. "The number of suitable sites", he said, "is very limited. Aerodromes have to conform to strategic requirements; they have to be sufficiently far away from existing aerodromes to avoid congestion in the air; they have to be on well-drained ground which can be prepared without undue expense, and in areas where suitable landing grounds for forced landings are available, and where meteorological conditions are reasonably good. Incredible as it may seem, there are, apparently, parts of England that are wetter and foggier than others. The Aerodrome Board has had an extremely difficult task in finding suitable sites conforming with all these conditions and at the same time free from reasonable objections from landowners or local residents. This last difficulty has not been a simple one. I find that objections centre largely upon birds. It is feared in some cases that they will be driven away from bird sanctuaries where it is hoped to preserve them, and in other cases it is feared that they will be driven away from shooting converts where it is the intention to destroy them. The Air Ministry have done their best to treat all objections in the most sympathetic way possible, and I am very glad to say that in most cases we have found local landowners and local bodies only too anxious to meet us in a like spirit. Similar troubles are met with in finding land suitable for other Air Force requirements, such as flying training schools, armament training camps, repair depots and the like."(1)

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(1) H.C. Debates, Vol. 321, col. 1670.

The procedure for the acquisition of land for aerodromes was a cumbrous one and there was a good deal of delay in many instances before possession could be obtained under the Defence Acts. Another delay was caused when clearance rights and easements had to be acquired under the Military Lands Acts, which were somewhat restrictive, while if public rights of way had to be closed or diverted, the procedure necessary for this purpose might take nine or ten months. There was also a very considerable time-lag in the making of bye-laws for coastal ranges. The question of obtaining fresh legislation to expedite the acquisition of lands and rights was considered at an Expansion Progress Meeting on 15 June, 1939, when it was decided to seek the necessary statutory powers and also to expedite the departmental procedure. The outbreak of war two and a half months later and the consequent availability of Defence of Realm powers made it unnecessary to obtain legislation for the purpose in question.(1)

The Airfield Board.

The Under Secretary referred in the extract quoted to the difficult task which the Aerodrome Board had in finding sites for aerodromes. Particulars of the composition and work of this important Board, the name of which was subsequently changed to the Airfield Board, were given in a secret report submitted by the Air Ministry to the Select Committee on National Expenditure on 3 September, 1943.(2) The report stated:-

"The Airfield Board was appointed in June, 1934. The officer who was then appointed and still is President had retired in November 1929, in the rank of Air Vice-Marshal, after having held the Inland Area Command; he has been a land-owner and has been a pilot for nearly 30 years. The President is assisted by another senior officer with flying experience, and three other members who all have flying experience; one is a considerable land-owner and a qualified civil engineer and another has extensive experience of airfield work in connection with civil aviation.

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(1) E.P.M. 171, pages 19 - 22.

(2) Air Ministry Paper No. 96, No. 5 Session, 1942-42. The Aerodrome (or Airfield) Board was not included with other Boards and Committees in the lists published each month in the Air Force List.

In addition, the services of the Civil Engineers and Lands Officers of the Directorate of Works are available to the members of the Board when making any local survey. Two representatives of the Board were appointed by the Admiralty in 1939, thus formalising a liaison which had already grown up with that Department."(1)

The Board, the report went on to explain, did not itself initiate enquiries for new airfields. Its task was to find them when asked to do so by the Director-General of Organisation, Air Ministry, who notified the President of the Board of the number and types of airfields required and of the areas in which they would have to be located. An officer of the Board therefore made a preliminary survey and when a site, or sites, prima facie suitable had been found, the President of the Board submitted a report to the Director-General of Organisation. The latter consulted the Director-General of Works, who reported in greater detail upon the proposed requisition, and the final selection was made in the light of such report and of the comments of the Air Ministry branches and other Government Departments concerned. When approved, the site was requisitioned by the Lands Branch, and so were the sites of all the ancillary buildings of the airfield - the dormitories and messing accommodation for the station personnel (suitably dispersed and well away from the landing ground), the technical buildings, the wireless telegraphy buildings, the sewage disposal works, etc.(2) The taking of the land usually meant some loss of crops, but this was kept as low as possible by co-operation with the County War Agricultural Executive Committees.(3)

The Airfield Board, the report pointed out, was not concerned with the selection of sites for stations which needed no aerodromes, such as Recruits Depots, Technical Training Schools, Initial Training Wings, certain Maintenance Units, Balloon Barrage Depots, wireless stations and bombing ranges. Sites for such units were proposed by the user Directorate - Maintenance, Signals, etc. - and the approving authority was, here again, the Director General of Organisation.(4) Enough work remained without them, in

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(1) Ibid., para. 22. The President referred to was Air Vice-Marshal Sir C.A.H. Longcroft.
(2) Ibid., para. 28.
(3) Ibid., para. 29.
(4) Ibid., para. 31.

all conscience, for the Airfield Board, and it was carried out with an unadvertised efficiency that concealed incidentally the real magnitude and importance of the task performed. The Board had a big share in the realisation of our Drang nach Osten in the years 1934 to 1939 and during the war.

The Knock-Out Blow.

The concentration of our air striking force in the east of England, and of the bulk of our interceptor force in the south-east (to protect London) was not without its special dangers. An air force must be sure of its bases, if it is to operate effectively. Our air bases were obviously exposed to attack, and it might be a devastating one when such superior strength as Germany possessed was available for it. It would be delivered naturally against the stations from which a retaliatory blow might be launched against Germany(1) and those from which our fighters would take off to break the assault upon this country. If Germany's air force could put ours out of action, and she might well expect to be able to do so by a massive attack upon our air bases, she would have gone far to win the war. Actually, she did employ tactics of this kind against Poland in 1939 and against Holland and Belgium in 1940. She practically destroyed those countries' air forces by attacks upon their aerodromes at the outset of each campaign. There was always the danger that she might immobilise us in the air in a similar way.

The existence of this danger was one of the stock arguments of those public men and writers who held that a national air force was no defence and that our only hope of escaping disaster was to organise an effective system of "collective security". "The question", it was contended, "is no longer which has the most planes, it is which gets his blow in first."(2) Given that initial, devastating stroke, aimed at an enemy's aerodromes and aircraft factories, retaliation - which was

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(1) In letters of 4 February and 14 October, 1938, Sir Edgar Ludlow-Hewitt, Air Officer Commanding-in-Chief, Bomber Command, drew attention to the exposed situation of the bomber stations in Yorkshire and East Anglia, and in particular of those at Driffield, Leconfield, Marham, Feltwell, Honington, Stradishall, Horsham St. Faith and Coltishall. Defence was provided for these factories in the shape of 3" guns and the pushing forward of our Fighter defence towards the coast in East Anglia. (S.43816).

(2) Sir Norman Angell, The Menace to our National Defences, 1934, p. 86.

ex hypothesi the sole defence - became impossible. "For our part", wrote a Swedish officer who analysed the nature of the "coming war", "we are persuaded that General von Seeckt hits the nail on the head when he says that it may be doubted if the country which has first been struck will be in a position to retaliate."(1) The belief that we should be secure if only we had a more powerful air arm could thus be shown to be nothing but a delusion. The folly of it was exposed as follows by one of the most determined critics of national re-armament:- "That is to say, our machines having been blown to pieces in their hangars, our factories destroyed, our nerve centres shattered, our population dying from poison gas - we are then to proceed to threaten the enemy with annihilation."(2) Clearly, only very stupid people could continue to pin their faith on the efficacy of our counterstroke in such circumstances.

Not only the aerodromes but the aircraft factories in eastern England were in an exposed position, and this fact was the cause of some uneasiness in the minds of the Air Council. It was discussed at an Expansion Progress Meeting on 25 January, 1938, a propos of an enquiry by the Ministry of Labour whether orders for aircraft etc. would be withheld from firms if they were moved into the North East Special Area. The Air Member for Supply and Organisation (Air Marshal W.L.Welsh) stated that we had hitherto avoided making any public statement about the special vulnerability of this particular area, and advised that the reply should be that we were making use of existing facilities in the area but that where a question arose of one of our contractors setting up a new factory in it we suggested the choice of a less vulnerable area. A reply was made to the Ministry of Labour in this sense.(3)

Troglodytic Air Stations.

One way in which we could at least save our aircraft from being caught and blown to pieces on the ground was to house them below the surface. The ideas was not new. Underground hangars had been tried at Manston in the last war, and though the plan had then been abandoned before

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(1) Major K.A. Bratt, That Next War, English Translation, 1930, p. 82.
(2) Sir N. Angell, op. cit., pp. 162-3.
(3) E.P.M. 109, page 18.

it was fully executed there was no reason why it should not be revived into better hope of success elsewhere. Many suggestions were made for schemes of this kind. They were not all by any means the products of cranks. Some of them were suggested by mean who knew what they were talking about. They were seriously considered at the Air Ministry. Early in the period of expansion the Air Staff devoted a good deal of time to this question and the conclusions reached were embodied in a note of 30 April, 1935. The note dealt with the question in relation to both operational stations and ~~to~~ storage units.

The policy which had been adopted at the stations, it explained, was to provide splinter-proofing for the hangars, so that the additional safety which underground construction would give would be confined to protection against a direct hit by gas, incendiary or high explosive bombs. Protection that was adequate against the last would be adequate also against gas or incendiary attack.

Lifts or Inclined Approaches.

Air attack against an underground target, said the note, would probably be made with semi-armour-piercing bombs. To ensure protection against a 500 lb. S.A.P. bomb the roof of the hangar would have to be not less than 45 feet below the surface, and for a 250 lb. bomb not less than 35 ft. The sizes of hangar doors were 35 feet by 150 feet and 30 feet by 120 feet, so that, for the most favourable combination of the lower hangar and the smaller bomb, the hangar floor would be 65 feet below ground level. From this depth it would be necessary to provide an exit by lift or by inclined approach.

"Lifts from an underground hangar", it was stated, "would have the following operational disadvantages:-

(i) liability to derangement by damage whether accidental or caused by a bomb;

(ii) contamination by gas;

(iii) delay in getting aircraft from the hangar;

(iv) dependence upon power supply.

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"An inclined approach has the following operational disadvantages:-

(i) the possibility of damage or contamination immobilising aircraft in the hangar;

(ii) assuming as steep a gradient as 1 in 15, the approach would, in the favourable case of a 65 feet depth, be over 300 yards and would seriously diminish the useful size of the aerodrome;

(iii) delay in getting aircraft from the hangar."

"It will be seen, therefore", said the note, "that from the purely operational aspect underground hangars would introduce delay in bringing aircraft into action and they might, in certain circumstances, cause their involuntary incarceration. Moreover, the accidental fire risk would, owing to the difficulty of getting aircraft quickly into the open, be increased in comparison with surface hangars".

The note went on to point out that in addition to the hangars, other buildings would also have to be considered - the technical and non-technical stores, signal communications, workshops and accommodation for personnel.(1) Furthermore, the hangars would contain only unserviceable aircraft for an appreciable portion of the time in which flying was possible; the serviceable aircraft would be in the air or in the open, awaiting take-off, or being prepared for the next attack. "Time will not normally permit, particularly in the case of fighters, of aircraft returning to the hangars between spells of duty".

Surface Hangars Preferred.

"The Air Staff therefore consider that adequate security is more desirably and economically obtained by splinter-proof dispersed hangars and by the scattering of aircraft about the aerodrome, or on satellite landing grounds, than by the construction of underground hangars, which/would

(1) An Intelligence Officer of Bomber Command has thus described the complexity of an operational station:-

"An operational station is a little world on its own. One has only to fly over it, make a circuit, and land, to realise how compact and isolated it is. Station Headquarters: the Watch Office: the Squadron Office: the Hangars: the Station Armoury: Maintenance: Stores: Sick Quarters: the 'Waafery': the Officers' Mess: the Sergeants' Mess: the Naafi: a huddle of Nissen huts for the sleeping quarters: and a huge bare airfield."
(A. J. Brown, Ground Staff, 1943, page 60).

would provide only limited security at great expense in capital cost[1] and maintenance with the certainty of operational delay, the risk of immobility and an increased fire danger."

The cost would be less for aircraft stored not at the stations but at other places where natural features facilitated the construction of underground hangars, e.g. by tunnelling into a hill. Storage of reserves of aircraft might be provided for in this way, but there would still be the increased fire risk and the loss of useful aerodrome space taken up by the inclined approaches. Here, again, it was the Air Staff view that, on the whole, storage units on the surface so sited as to be difficult to identify from the air and located outside vulnerable areas, fulfilled safety needs sufficiently.[2]

The question was re-considered on a number of subsequent occasions, and the view taken in 1935 was upheld. It was discussed at an Expansion Progress Meeting on 24 March, 1936, when Lord Swinton and Lord Weir both declared themselves opposed to the suggestion, and no dissent from their view was expressed by the members of the Air Council present. Lord Weir went so far as to say that if we put our hangars underground we should be risking defeat in war.[3] To place the hangars underground, the Director of Works pointed out in a minute dated 21 December, 1938, would not prevent the aerodrome as a whole from being put out of action; the runways, which were 1100 to 1400 yards long (they became much longer subsequently) might be cratered and rendered unserviceable. There was a case for the underground storage of bombs in bulk, and protection of this kind was in fact provided in quarries at Chilmark and Box in Wiltshire, at Fauld in Staffordshire and at one or two other places. For aircraft and other equipment, however, it was considered that dispersion, camouflage and satellite aerodromes rather than any system of burying were the answer to the threat of air attack on air bases. The same policy was maintained, it may be added, after the war had begun.[4]

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(1) Underground aircraft storage, the note stated, would cost at least four times as much as surface storage.

(2) The note is contained in Air Ministry file S.35787, as is also the record of the later discussions.

(3) E.P.M. 33(3).

(4) See report of the Sub-Committee on Underground Storage of the Engineering Advisory Committee, A.C.E.(42) 7, 25 February, 1942.

The Policy Justified.

The policy adopted was approved by the event. In August, 1940, the Germans made a determined attempt to destroy the fighter air bases in southern and south-eastern England. The aerodromes at Croydon, Hawkinge, Manston, Kenley, North Weald, Hornchurch, Debden, Lympne, Middle Wallop, Duxford, Northolt, Tangmere and Biggin Hill were heavily attacked, and some of them were put out of action temporarily. The onslaught continued during the early days of September, and by the 6th of that month the enemy believed that he had succeeded in immobilizing our fighter force, at any rate Group 11 of it, so that London now lay at the mercy of his dive-bombers. He had not succeeded. Our interceptors, though they had to shift their ground now and then, were not driven out of the air. The system of elastic defence which we had adopted served us well. Whether the defence would have been as effective if we had buried our hangars may well be doubted. From the wider point of view, the events of 1940 and the following years, when our strategic air offensive against the Reich was maintained, went to show that the decision to move our air bases to the eastern side of England had not been a mistake. Our Drang nach Osten was well inspired, despite its risks.

CHAPTER VIII

REVIEW OF THE EXPANSION

St. George's Mistake.

The expansion was necessary because a job was not properly finished in 1918. The dragon of German aggression was thought to have been slain then. Alas! he was not slain. Grievously wounded, he yet revived and twenty years later he was a more formidable dragon than of old. Meanwhile, St. George had laid his panoply aside. How, when the dragon revived, he began to collect and re-sharpen some of his weapons, is the subject of this monograph. The further questions why he ever laid them aside or let them rust, or why he and the other Knights - who knew that the dragon was dangerous - ever let it get up again, once it was down, are not dealt with here. These are subjects chock-full of the dynamite of political controversy and are better left untouched.

In 1918 Great Britain possessed the most powerful air force in the world. She disbanded it, except for a nucleus, after the war, and in a few years she was only a fifth rate power in the air. No such voluntary self-disarmament was to be seen in other countries. Obviously we could not allow such a condition of inferiority to continue indefinitely. In 1923 we began to re-arm, in a very modest and leisurely fashion. The programme then adopted was still far from complete ten years later, although it should have been finished in five years. The reasons for the retardation were partly political and partly financial. The political factors operated both before and after the financial, and indeed to some extent all the time. The conclusion of the Treasy of Locarno in 1925 inspired the belief that there was no such urgency about re-armament as there had been thought to be in 1923. The economic blizzard of 1929 swept away lingering doubts about the policy of embarking upon a spending programme for that purpose. Then, in 1932 - 34, the prospect that the Disarmament Conference might result in other countries moving down to our level, so that we need not move up to theirs, provided a further argument for the policy of going slowly for the present.

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The Genevan Interlude.

The Conference has a necessary place in the record of our re-armament in the air, for several reasons. In the first place, it interrupted the re-armament; we added not a single squadron to our still uncompleted Home Defence Force in 1932 and 1933. In the second place, if it had been a success there would either have been no expansion in 1934 - 39 or only a very modest one. In that event it is quite possible that we should have lost the war. That may be challenged as a far-fetched forecast. It is not more far-fetched than a forecast that Germany would have observed faithfully any limitations agreed upon at Geneva. It is unlikely that she would have been satisfied with the establishment which her neighbours, and especially France, were prepared to allow her. No doubt some system of international supervision would have been organised. She would have found ways of circumventing the restrictions as she circumvented those laid down in the Treaty of Versailles. The result would probably have been that we, lulled into a false security, would have been in a worse position, and she in no worse a position, than that in which we and she, respectively, were in 1939. To deny that that could have happened seems to be to indulge in wishful thinking.

It is quite certain that Germany had begun to create an air force even before Herr Hitler became Reichskanzler in January, 1933. The evidence is to be found in the life of General von Seeckt by his friend General von Rabenau. After October, 1933, when the German delegation walked out of the Conference, the building of the German air force proceeded apace. By March, 1935, it was as large as ours; Herr Hitler admitted this to Sir John Simon and Mr. Eden at that time. That admission was the immediate cause of the adoption by a Government of the second of the "Schemes" which followed one another, in a rather puzzling, irregular trot, in the years 1934-39.

The Schemes of Expansion.

The first of them was Scheme A. It was a very modest programme adopted in July, 1934, when the shipwreck of the hopes founded on the Disarmament Conference had become apparent to all. The programme inspired

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by Herr Hitler's disclosure of March, 1935, was labelled Scheme C. There was no Scheme B. Scheme C was followed by Schemes F, L and M. Schemes H, J and K were formulated also but never passed beyond the stage of proposals; and the missing letters represented tentative suggestions which did not mature even to that extent. As a whole, the schemes were a distinctly mixed lot. Some were pure window-dressing. The purpose of them was to make a show of force and thus, it was hoped, to deter Germany from proceeding with her plans. There was plenty of justification, politically, for such a resort to psychological warfare; it might well have had the desired result. Militarily, however, such schemes were unsound. They erred in so far as they departed from the fundamental principle that the reserves of equipment are no less important than that which is in actual use. They crammed everything possible into the first line and neglected to provide a background to the façade. Fortunately, as is explained later, the tendency to create a force which looked stronger than in fact it was was checked, and the schemes which mattered most, such as F and M, did not err in this particular way. They were, on the whole, sound and well balanced schemes, so far as they went, which was not quite far enough. Not one of our schemes was quite bold enough.

Scheme C was notable in so far as it provided (in 1935) for a Metropolitan Air Force of 123 squadrons, which was, in fact, only one less than the number of squadrons on our nominal (bus alas! not actual) first-line establishment in the autumn of 1939. The programme was, however, to have been completed in 1937 - which, in point of fact, it could not possibly have been - and long before then it was superseded by another one: which was the fate of a number of schemes. It could not be otherwise when the goal at which we were aiming, that is, something approximating to parity with Germany's air strength, was a receding one. As we moved up, Germany moved on; we seemed to come no nearer to her for all our efforts to overtake her.

Scheme F, which replaced Scheme C, was the longest-lived of all the Schemes. It was the only one which ran its full course and was completed before the war began. Framed in the light of a reported speeding-up of Germany's re-armament, it provided for a Metropolitan Air Force of

nearly 1750 first-line machines, as compared with a little over 1500 under Scheme C. It was due for completion, and was completed, by 31 March, 1939; which did not mean (see later) that we had in fact 1750 first-line aircraft then. It was a distinct improvement on Scheme C in so far as it gave our air striking force more offensive power and provided more adequate reserves. It was approved in February, 1936.

The Shadow Factories.

The same year (1936) witnessed the reaching of another landmark in our advance towards parity, not yet disavowed as the objective of our efforts. The programme of construction involved in Scheme C had not been beyond the capacity of the "professional" aircraft industry, that is, the score of airframe and aero-engine manufacturers who normally supplied the needs of the Air Force. Scheme F, however, was too large for these firms to undertake, unaided, and it was therefore decided to bring into operation the "shadow factories" which it had been intended to reserve for zero hour. The factories in question were large motor plants in the Birmingham and Coventry districts and in order that the ordinary business of the manufacturers concerned should not be interfered with, the shadow factories were erected in close proximity to the parent works. This involved some additional risk in the event of air attack, but it facilitated supervision of the new works and lessened the difficulty of labour supply. Strictly, the opening of the shadow factories for the purpose of the pre-war expansion was a departure from the purpose for which they were intended, which was to serve as an additional source of supply after war had begun. The departure could be justified on the grounds that they were thus prematurely brought into use mainly for the purpose of providing a war reserve of engines and airframes.

What was more challengeable was the choice of one of the two aircraft to be constructed under the scheme. This, the Fairey Battle, was really obsolescent even in 1936. It was quite outclassed by other medium bombers long before the first Battle left the Austin factory at Longbridge. It is a matter of history that the Battles had to be taken out of the line in the spring of 1940 after suffering heavy losses over the western front.

/Schemes

Schemes H, J, K, L and M.

Scheme F, good though it was within the limits, would not have given us parity. Scheme H, proposed at the end of the same year (1936), was more ambitious, but, unlike F, it was utterly unsound in structure. It increased first-line strength by robbing the reserves and the overseas formations. It was withdrawn almost at once after it was proposed, and the next scheme - J - which followed it a year later also failed to commend itself to the Cabinet.

Scheme J was in some respects the best of all the pre-war proposals. If it had been speeded-up, and if the implications of the speeding-up had been accepted and the necessary measures taken to expand production, it would have enabled us to make up at least most of the lee-way in our pursuit of parity. It would have given us a Metropolitan Air Force of nearly 2,400 first-line aircraft, including nearly 900 heavy bombers, by the summer of 1941. Such progress was altogether too slow. Germany would have had as many aircraft by the end of 1939. To put us on even terms we should have had to accelerate the completion of the scheme considerably, and that would have meant the abandonment of the rule then prevailing, of "no interference with the course of normal trade", and, in particular, the drafting into the aircraft factories of a labour force that could have been formed if that rule had been dropped. As it was, the labour supply was always insufficient. Even in May, 1938, the number of people employed in the aircraft industry was only 90,000(1) - a figure which takes on a sombre significance when one remembers that in 1918 the corresponding figure was nearly four times as great, that a far greater number of man-hours was needed to produce an aircraft in 1938, and that an all-out effort comparable to that of 1918 would have been called for if we were to have had any hope of matching Germany's production in 1938.

The time was not yet ripe, however, for the making of such a national effort. The need of it was not realised. That is evident from the fact that the Cabinet rejected Scheme J because it involved too much expenditure. The Air Ministry was instructed to prepare a cheaper version of it. /The

(1) Statement by Earl Winterton in the House of Commons, 12 May, 1938, H.C. Debates, Vol. 335, col. 1771.

The Air Ministry did so, in the shape of Scheme K, but by the time the new proposals came before the Cabinet (March, 1938) the German move into Austria had occurred, and the necessity for an accelerated programme became evident. Scheme L was the result. It provided in the usual way for a number of bomber, fighter and other squadrons; it was not adopted in that definite form. What was approved (on 27 April, 1938) was a programme of construction which represented the maximum output estimated to be obtainable from the industry within two years, Scheme L being kept as a sort of background to this programme. The output contemplated was 4,000 machines in the first year and 8,000 in the second. Long before the first year had passed, however, the Munich crisis occurred, and the relegated Scheme L was superseded by Scheme M, which was approved on 11 November, 1938: approved, that is to say, in the sense that the establishment for which it provided - 2550 first-line aircraft - was substituted for that contained in Scheme L - 2370 first line aircraft, the constructional programme already in force being continued meanwhile.

Scheme M was a great advance on Scheme L in so far as it provided for a striking force of 1360 bombers, all heavy, as compared with 1350 bombers, of which only 750 were heavy, in Scheme L. It raised the number of fighters, again, from 600 to 800. It was not timed for completion, however, until 31 March, 1942, that is, two years later than Scheme L. Actually, it was the establishment laid down in Scheme F and not M (or any other scheme) which, if our position in regard to reserves had been more satisfactory, would have been available, with a slight increment, in the autumn of 1939. The 124 squadrons and (approximately) 1750 first-line aircraft authorised by Scheme F nominally existed then. We had not, however, that establishment. Some of the squadrons had to be "rolled up" to provide six weeks' reserves, whilst others were needed to serve as training units, and as a result the effective first-line strength of our Metropolitan Air Force did not exceed 1500 aircraft in September, 1939. To produce that number, moreover, we had to leave the fighter squadrons with practically no reserves behind them. The first-line strength of the Luftwaffe was then about 4,000 aircraft, with sufficient reserves behind it. We were therefore in a position of very decided inferiority.

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The Modernisation of the Air Force.

What saved us was the qualitative superiority of our Air Force. This compensated for our quantitative inferiority. If we lost one race in those years of expansion, we won another. We succeeded in getting a slight lead in the matter of performance, and we kept it. We did so only because, all the time, we were doing something else than expanding our equipment: we were improving it, perfecting it, worrying it into something a little better than it was. That meant, inevitably, recurrent interference with and interruption of the process of production, which was slowed down pro tanto each time the Air Ministry wanted some improvement incorporated in the machines under construction.

Furthermore, there was taking place in those years a cyclical change of still more far-reaching import. It was a change comparable to that which took place when, in the sixties and seventies of the last century, the ironclad replaced the three-decker in our Navy. In 1934-39 our Air Force was transformed from one kind of force into another. It was a force of wooden biplanes in 1934. It had become a force of all-metal monoplanes - save for a few survivals - by the autumn of 1939.

In 1934 our fighter squadrons were equipped almost wholly with Bulldogs and Furies. Our bomber squadrons had mostly Wapitis, Harts, Gordons and Virginias. The affinity of these types to the fighters and bombers of 1918 was closer than that which linked them with the up-to-date types of 1939. The substitution was proceeding throughout the years 1936 to 1939; the winter of 1938-39 witnessed the peak of the transformation. In September, 1938, our bombers were already beginning to present a different appearance; the change in the fighters came more slowly. The Battle, Blenheim and Whitley were in service then; the Wellington and Hampden were still to come. The fighters were still largely Gauntlets, Gladiators and Furies. There were five Hurricane squadrons to give a semblance of modernity to this array of biplanes, but only a single Spitfire squadron to keep them company as yet. It was perhaps fortunate for us that fate did not ordain that we should fight the Battle of Britain soon after the Munich crisis. The Germans had plenty of Messerschmitt 109's in service then.

/Eight

Eight-gun Fighters and Four-engined Bombers.

The modernisation of our equipment involved the taking by the Air Ministry of a number of decisions of difficulty and of great moment. Two of these stand out from all the rest. They were those relating to the eight-gun fighter and the four-engined bomber. Each decision was in the nature of a gamble. The gamble came off. It might have failed and if the first had we should probably have lost the Battle of Britain. As it was, the decisions in question meant our losing the race for parity - or whatever became the paraphrase for parity in 1938. We took the long-term view and in doing so we practically threw away all hope of overtaking Germany's lead in numbers before the clash of arms should come. Were we wrong? Assuredly not. We made it as certain as anything of the kind could be that in the end we should have the upper hand in the air, alike in defence and offence.

With the introduction of the eight-gun fighter the names of two officers of the Royal Air Force will always be connected - those of the late Wing Commander A.T. Williams and of Squadron Leader (now Air Marshal Sir Ralph) Sorley. The armament which they in their foresight so strenuously advocated needed, however, the appropriate machines to carry it, and for these as great a debt is due to the designers of the Spitfire and the Hurricane, the late Mr. R.J. Mitchell and Mr. Sidney Camm, respectively. These four men were the architects of the victory which saved us in 1940.

The introduction of the hundred-foot-span bomber was as notable a landmark in the progress of our re-armament. It was to speak out very loud and bold in 1935 to talk in the same breath of a bomb load of 14,000 lb. and a range of 2,000 miles, or of a load of 8,000 lb. and 3,000 miles. It is true that there was to be accelerated take-off; catapulting was contemplated in the original conception. It was dropped fairly soon, however, and even for normal take-off the loads and ranges prescribed were ambitious for their date. They were in excess of anything that Germany was planning. Great care was taken on that account to keep our plans secret, but Germany must have had some suspicion of what we were doing, especially when one of the prototype Stirlings crashed on its trials on 4 May, 1939, and the fact was reported in the Press. She was committed

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to her own constructional plans, however, and these were different from ours. For the Wehrmacht the bomber arm was merely a form of long-range artillery, ancillary to the Army. The Germans never grasped the importance of the strategic air offensive.

The Reasons for our Inferior Numbers.

Our four-engined bombers were not ready for service when the war began, or even - which was a different thing - when the air war began with the passing of the "phoney war" stage in May 1940. Our two-engined Wellingtons, Hampdens and Whitleys were, however, available, and there were many more Hurricanes and Spitfires in service in the fighter squadrons than there had been a year earlier. In general, the process of the modernisation of our Air Force could be regarded as reasonably complete. What was lacking was not up-to-date equipment but numerical strength. For our inferiority in this respect there were a number of reasons.

There was the failure, for instance, to enlist before 1938 as fully as was possible the aid of the aircraft firms who did not ordinarily tender for Air Ministry contracts. There was the failure to bring into the drive for expansion a number of outside contractors who could have helped and who did eventually help. There was the hesitation to spend what seemed to be astronomical sums then on a single arm of the service. There was the reluctance to shock the electorate by too crude an expression of the truth that even a democracy must sometimes put guns before butter if it is to survive. There was a disclination to ask the nation to throw itself into the business of re-arming with the abandon, the wholehearted fervour and enthusiasm which the Germans displayed. We seemed to be clinging desperately to the hope that the war would not come. We did not want it to come. We do not like war. The Germans do - or did.

There was also throughout the period of the expansion a tendency to underrate the German effort. Even those who tried to find out how our progress compared with Germany's had the utmost difficulty in arriving at the true facts. The extraordinarily wide estimates of her and our strengths given in Parliament and the Press show how little was really known about this subject. People were bothered and bewildered by all our schemes - A, C, F and so on. No one could say what the real position was.

The Expansion of Personnel.

The expansion of the personnel of the Air Force was proceeding, not quite pari passu, with that of the material in the years 1934-39. The greatest advance was recorded in the later part of that period. In 1934 the regular Air Force numbered a little over 30,000 officers and men. By 1 September, 1939, it had increased to nearly 118,000. Behind this active force there stood the regular reserve numbering about 9,400 in mid-1934 and 24,500 on 1 September, 1939. There was also at the latter date a further reserve which had not existed in 1934. This was the Royal Air Force Volunteer Reserbe, which began to form in April, 1937, and by September, 1939, had become nearly as large as the regular reserve, its strength being over 21,000. Even with this re-inforcement we should probably have had difficulty in replacing the wastage of air crews after the real operations began if we had not adopted in October, 1939, a very remarkable scheme which put an end, once and for all, to all apprehensions on this score.

The scheme was that known as the Commonwealth Air Training plan. It was one of the master-plans of the war. If Canada had done nothing more towards the winning of the war - and, of course, she did a great deal more - than taking the leading part in carrying out this great plan, she would have earned the gratitude of all men of goodwill. No measure taken by our own and the Commonwealth Governments surpassed it in boldness of conception and practical wisdom. It ensured that in no circumstances should we lack the pilots and air crews needed to man the vast armada of the air which was coming into being and was destined to have a profound influence upon the issue of the war.

Another measure which helped to ease the strain upon our man-power was the inauguration of the Women's Auxiliary Air Force shortly before the war began. Originally a part of the Auxiliary Territorial Service, this great force of women became in time an invaluable element of our air strength. It relieved the men of the Air Force of a whole host of duties which it had not been imagined a few years before that women would be capable of performing. Numbering approximately 7700 at the beginning of the war, the W.A.A.F. had increased to the very remarkable figure of nearly 170,000 by the autumn of 1944.

Among the duties which the women were found competent to undertake was the handling of some of the balloons which protected our centres of population from enemy aircraft and, in 1944, from flying bombs. The balloon barrage was mainly manned by officers and men of the Auxiliary Air Force, whose numbers increased from 1500 in mid-1934 to 23,000 on 1 September, 1939, chiefly as a result of the organisation of the balloon section between these dates. The regular Air Force, the regular reserve, and the R.A.F.V.R., as already stated, numbered 118,000, 24,500 and 21,000 respectively, at the latter date. With the Auxiliary Air Force there was thus available a strength, all told, of about 186,500 officers and men when the war began.

Our Superb Air Force.

The increase, as compared with 1934, which that figure represented, was a respectable effort, prima facie a remarkably creditable one, but the sober truth is that it was not good enough. We still had less than half the number of officers and men whom we had had in November, 1918, and Germany was far stronger in the air in 1939 than she had been twenty-one years before. Here, again, as in the matter of equipment, we had not realised in time the magnitude of the effort that would have been needed if we were to overtake her lead.

Fortunately, and by the favour of Providence, the stuff of our Air Force was superb. We ought to have had more men; so ought Henry V at Agincourt. In the event there were enough. Small as it was, the Air Force was an absolutely first-class one. It was in sober truth a force mighty in battle. It was splendidly trained, well organised, unmatched in skill and in morale, designed for operational employment in accordance with a sound strategic doctrine. Professionally, it was the best Air Force in the world. It proved that it was when it met and broke the fury of the German onslaught in the autumn of 1940. It is not national prejudice to claim that no other air force then in existence could have done that. When everything is said that can be said in condemnation of our failure to take the full measure of the German meance in time, the fact remains that the Royal Air Force saved the cause of freedom and civilisation.

/Bomber

Bomber Command Wheels East.

How the fighters broke the assault of the Luftwaffe in the Battle of Britain is known to all. How in the years that followed our bombers tore the heart out of the industrial Reich is known, too. What is less fully known is how the foundations for that great offensive were first laid during the period of the expansion. Very few people appreciated then what was happening to our line of battle in the air: something very important indeed. It was being shifted across England. It had faced south. It ended by facing east. In five years there was effected a transformation as momentous as anything that happened during those years of preparation; yet it was only a beginning.

In 1934 there was just one operational bomber station to be found in all the broad acres of Yorkshire, Lincolnshire, Norfolk, Suffolk and Essex. By 1939 that region of England had begun to take on a different and (for Germany) more sinister appearance. How its fall from grace began can be traced in the drab pages of that repellent compilation, the annual Air Estimates for the pre-war years. There, under Vote 4, one can mark the stages of the rake's progress from 1935 to 1939. Names now familiar to the bomber crews of Britain, Canada and the United States begin to creep into the lists in which details of the new stations to be constructed appear: names of ill portent for Germany, for the new bases which were beginning to arise were all pointing towards the North Sea. One can see there the small origins of the great network of air bases which by 1943 had converted the eastern half of the island into one vast launching platform for bombers. The pattern was filled in only after the war had begun, but the outline of it was traced in those years of expansion. In tracing it we were carrying to the logical conclusion our acceptance of the doctrine of the strategic air offensive. The creation of the capacity to wage that offensive effectively was a major objective of our policy.

Our Two Objectives.

Reviewing the expansion as a whole, one can see that, apart from the deterrent aim, it had two such objectives. Of these, one was attained by the time that the first serious encounters came, and the other was not,

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though it was eventually attained. The one attained was the provision of a defensive air force capable of inflicting crippling losses on the enemy's offensive air force if it should cross our coasts. This aim was achieved mainly because, long before Germany, we had grasped the importance of the multiple machine-gun armament for fighters, and had also developed radiolocation earlier. The other aim was the creation of a striking force with a hitting capacity as great as Germany's. That this was always an objective of our policy is clear from the official records. It remained one even after we had given up the attempt to obtain general parity in the air. Even Lord Swinton in his speech in the House of Lords on 12 May, 1938, when he denounced the idea of parity in general as a mistake, did not go the length of jettisoning this particular aim; indeed, his statement implied its retention. This aim we did not attain before the first testing time. Germany had a far stronger striking force in 1940-41 than we had. Our failure to attain it was due, in part, at least, and paradoxically, to our being wiser, here again, than was Germany. We were really thinking ahead of her all the time.

We saw in the bomber an instrument for smashing the enemy's war effort at its source; and we saw, too, that the big bomber was a better instrument than the medium bomber for this purpose. Germany pinned her faith on the smaller bombers and a lot of them, used, in effect, as mobile artillery. We might possibly have had as many as she if we had taken the same view. We did not. We sacrificed the immediate to the ultimate interest. We made sure of victory in the end, at the cost of tribulation in the meantime.

The commencement of the building-up in eastern England of that stupendous rampart of air bases from which the four-engined aircraft of the Bomber Commands of the Royal Air Force and of the 8th United States Air Force sallied forth to batter the Reich was one of the outstanding events of the period of expansion. Here, assuredly, as in our whole attitude to the strategic offensive, there was nothing half-hearted or hedging about our planning or the execution of it. The Air Staff knew

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what it wanted and got it done. The conception and the consequent action were among the happiest inspirations and most fruitful measures of the period of expansion. The full fruits were not gathered until the war had been in progress for some years, but at least we had begun to till the ground wisely beforehand. For that foresight we should always be grateful.

APPENDIX 1

NOTES AND STATISTICS OF R.A.F. PRE-WAR EXPANSION SCHEMES

(Fleet Air Arm figures included up to end of 1937)

SCHEME "A" (for completion by 31. 3. 39.)

DESCRIPTION.

Scheme "A" was designed to provide a maximum first-line strength and, therefore, lacked adequate reserves. Its aim was primarily political in scope and the scheme was meant to "deter" Germany and to impress public opinion at home. No advanced types of Service aircraft were included in the programme.

TABULAR STATEMENT

Date of proposals and authority	Cabinet Approval	M.A.F. Sqns.	M.A.F. a/c	Overseas Sqns.	Overseas a/c	Total M.A.F. & Overseas Sqns.	Total M.A.F. & Overseas a/c	F.A.A. Sqns.	F.A.A. a/c	Composition of M.A.F. (Bracketed figures indicate Non-regular Sqns.)	Increases in Sqn. I.E.	Provision for Reserves
16.7.34. C.P.193(34) Interim Report of Ministerial Committee on Disarmament.	18.7.34. Cab (29) 34	84	960	27	292	111	1252	16½	213	Type / Total Sqns. / (I.E) / Total a/c F 28(5) 12 336 LB 25(8) 12 300 MB 8 12 96 HB 8 10 80 TB 2 12 24 GP 4 12 48 FB 4 4 16 AC 5 12 60 54(13) 960 Included an Air Striking Force of:- 43 Sqns. of 500 a/c.	+ 4 a/c No previous provision	£1,200,000 was to be provided for war reserves up to 1938/9. Reserves beyond that date were deferred. This provision was based on the assumption that the R.A.F. was not required to be ready for war until 1942. The Interim Report of Min. Ottee. on Disarmament however, pointed out that "The reserve must be provided before an outbreak of war becomes imminent". C.P.193(34).

SCHEME "C" (for completion by 31.3.37.)

DESCRIPTION

Scheme "C" was the direct result of Sir John Simon's and Mr. Eden's conversations with Herr Hitler in Berlin on 26.3.35.

It was the first scheme which was designed to achieve parity with the German Air Force in accordance with Mr. Baldwin's pledge of 8.3.34.

The information given by Hitler was -

(a) that Germany had already reached parity with the U.K. in the air, and

(b) that it was Germany's intention to build up to parity with the French Air Force in France and North Africa, which Hitler assessed at a total of 2,000 first-line aircraft.

This statement was regarded by the Air Staff as an exaggeration. It was estimated that Germany would achieve a first-line strength of 126 squadrons of 1512 aircraft by the Spring of 1937. Scheme "C" was meant to give "parity" with this force on a purely numerical basis of first-line a/c, including in the M.A.F. all non-regular and regular squadrons but not units of the Fleet Air Arm.

It was, in fact, realised that Scheme "C" would not give true parity with Germany but the programme was accepted as the best that industry could achieve by 31.3.37. under peace-time conditions of production.

In essentials Scheme "C" was again meant to be "deterrent" in effect.

TABULAR STATEMENT

Date of proposals and authority	Cabinet Approval	M.A.F.		Overseas		Total M.A.F. & Overseas		F.A.A.		Composition of M.A.F. (Bracketed figures indicate Non-regular Sqns.)				Increases in Sqn. I.E.	Provision for Reserves
		Sqns.	a/c	Sqns.	a/c	Sqns.	a/c	Sqns.	a/c	Type	Total Sqns.	(I.E.)	Total a/c		
4.5.35.	21. 5.35. (Cab (29) 35	123	1512	27	292	150	1804	16½	213	F LB MB HB TB GP FB AC	35(5) 30(11) 18 20 2 7 6 5	12 12 12 12 12 18 6 18	420 360 216 240 24 126 36 90	 + 2 a/c + 6 a/c + 2 a/c (at home) + 6 a/c (at home)	As for Scheme "A"
											123(14)		1512		
										Included an Air Striking Force of :- 70 Sqns. of 840 a/c					

SCHEME "F" (for completion by 31.3.39.)

DESCRIPTION.

Scheme "F". The background of Scheme "F" was the continuing German re-armament in the air and the outbreak of the Italo-Abyssinian conflict.

Its main features were:-

(1) the re-organisation of the Air Striking Force so as to improve its offensive power as suggested by S. of S. for Air in C.P.(37)36, dated 10.2.35.

(2) the decision to provide adequate war reserves in peace behind the first-line strength, (as proposed by D.R.C.37, para.83).

(1) With this object in view the scheme proposed to re-arm all the light bomber squadrons with medium bombers, increasing the establishment of the 19 regular squadrons so re-armed from 12 to 18 aircraft, and increasing the I.E. of 10 Scheme "C" MB squadrons from 12 to 18 aircraft. The remaining 8 Scheme "C" MB squadrons were to be re-armed with Vickers Medium bombers on the basis of 12 I.E. and the establishment of the torpedo bomber squadrons raised from 12 to 16 aircraft.

(2) The original calculation of the basis of war reserves was that they should be sufficient to cover the first four months' wastage, after which it was thought war potential would be adequate to cover aircraft losses month by month. The figure of 150% of first-line strength represented the reserves considered necessary to cover the average anticipated wastage rates among the various types of M.A.F. squadrons during the first three months of war. The fourth month's wastage was to be met from the immediate reserves and workshop (maintenance) reserves for Scheme "F" (stored, immediate and workshop) totalled 225% of first-line strength.

(3) the provision of Army Co-operation Squadrons to accompany the Field Force. For this purpose the five regular Army Co-operation squadrons of Scheme "C" were to be re-organised to provide seven under Scheme"F". In addition, four non-regular squadrons were to be assigned to the Territorial Army.

(4) ten squadrons were added to the Overseas Force in face of the continuing threat in the Far East.

(5) the first-line strength of the Fleet Air Arm was to be raised to 504 aircraft by 1942 to correspond with the naval programme.

TABULAR STATEMENT

Date of proposals and authority	Cabinet Approval	M.A.F.		Overseas		Total M.A.F & Overseas		F.A.A.		Composition of M.A.F. (Bracketed figures indicate Non-regular Sqns.)				Increases in Sqn. I.E.	Provision for Reserves
		Sqns.	a/c	Sqns.	a/c	Sqns.	a/c	Sqns.	a/c	Type	Total Sqns.	(I.E.)	Total a/c		
21.11.35. D.R.C.27 Pt.VI & Schedule III. 3rd Report of the Defence Requirements Sub. Ctte. of the C.I.D.	25.2.36. Cab(10) 36	124	1736	37	468	161	2204	26*	312	F	30(5)	14	420	+ 2 a/c	£50,000,000 allocated to provide war reserves of 150% of first-line strength for R.A.F. and 135% for F.A.A. Together with Sqn. reserves this provision would bring the total reserves of a/c in the R.A.F. to 225%. Additions were also made to the reserves of personnel.
										MB	29	18	522	+ 6 a/c	
								40* by 1942.	504	MB	19(11)	12	228		
										HB	20	12	240	+ 4 a/c	
										TB	2	16	32		
										GR	7	18	126		
										FB	6	6	36		
										AC	11(4)	12	132	- 6 a/c	
											124(20)		1736		
										Included an Air Striking Force of:- 70 Sqns. of 1022 a/c.					

SCHEME "H" (interim programme for completion by 31.3.39)

DESCRIPTION.

Scheme "H". The original proposals for Scheme "H" were framed in response to information received by the Air Staff in October 1936 suggesting that the German Air programme was aiming at a first-line strength of 2,500 aircraft (including 1,700 bombers) by April 1939. The aim of Scheme "H", as outlined in C.P.(18)37, was to achieve "a striking force not inferior to that of Germany" and "a fighter force requisite to meet the probable scale of attack". As these objectives could not be achieved by March 1939, it was decided to put forward an interim plan which would allow a M.A.F. of 2,422 aircraft to be completed by that date, including a striking force of 1,631 bombers. This was to be done:-

(a) by temporarily drawing on the war reserves provided under Scheme "F", in order to create a much larger first-line strength;

(b) by temporarily retaining at home 10 new Overseas squadrons;

(c) by providing for the formation of 11 medium bomber squadrons, by April 1939, and by increasing the I.E. of the various types of bomber squadrons. The I.E. of the G.R. squadrons was also slightly increased to enable them to adopt the bomber tactical formation in the air should it become necessary to utilize these squadrons for bombing operations.

Scheme "H" was considered by the Cabinet on 14th January 1937 but was withdrawn:-

(i) because General Milch had assured A.V.M. Courtney that the current G.A.F. programme aimed at a first-line strength of 1,620 aircraft by the Autumn of 1938. If this statement were regarded as true then Scheme "F" would have afforded numerical parity with a "time-lag" of only six months.

(ii) because of the growing difficulties of the aircraft supply problem.

Revised proposals were put forward by the S. of S. for Air in D.P.R.168, dated 11th February 1937, Scheme "H" as such was withdrawn but, in view of the German aircraft industry's ability to expand the G.A.F. up to 2,500 aircraft by April 1939, it was decided to approve such measures as would enable Scheme "H" to be implemented at short notice if necessary. These measures, approved by the Cabinet on 24th February 1937 (Cab.(9)37), included the additional recruitment of pilots and skilled tradesmen and the purchase and preparation of the land for 13 additional operational airfields in excess of the requirements of Scheme "F".

TABULAR STATEMENT

Date of proposals and authority	Cabinet Approval	M.A.F.		Overseas		Total M.A.F. & Overseas		R.A.A.		Composition of M.A.F. (Bracketed figures indicate Non-regular Sqns.)	Increases in Sqn. I.E.	Provision for Reserves
		Sqns.	a/c	Sqns.	a/c	Sqns.	a/c	Sqns.	a/c			
1.1.37 E.P.M.(3)37 & 14.1.37 C.P.(18)37	14.1.37. Rejected original Scheme "H".	On Mobilization 145	2422	27	348	172	2770	30	348	On Mobilization		The overall war reserves of a/c (initial, workshop and stored) were reduced from 225% to 100% of first-line strength. This was done to provide a M.A.F. of the required strength of 31.3.39. The full reserves of a/c and personnel on the scale authorised under Scheme "F" were, however, to be restored by 1941.
	24.2.37. Approved certain measures to enable Scheme "H" to be implemented at short notice.									Type / Sqns. (I.E.) / Total a/c F 34(9) 14 476 MH 8 14 112 M 47(7) 21 987 H 20 14 280 TB 2 21 42 Overseas retained at home 10 21 210 GR 7 21 147 FB 6 6 36 AC 11(4) 12 132 145(20) 2422 Included an Air Striking Force of:- 87 Sqns. of 1631 a/c.	+ 3 (+9) a/c + 2 a/c + 3 a/c + 3 a/c	

SCHEME "J" (for completion by Summer of 1941)

DESCRIPTION

Scheme "J". The Air Staff brief in preparing Scheme "J" was to provide a M.A.F. which would be "(a) a reasonably effective deterrent and (b) enable us to meet Germany as nearly as possible on equal terms". (D.D.(P)12 Memo. of S. of S. for Air, dated 27th October 1937).

The Air Staff plan to achieve "parity" was now conceived in terms of the number and offensive power of the respective bomber types i.e. the yardstick of numerical parity (except as regards the Striking Force) was abandoned.

The M.A.F. bomber force of 1,442 aircraft was meant to achieve parity with the striking force which Germany would possess by the end of 1939. Scheme "J" (Metropolitan) thus envisaged the acceptance of a lag of 18 months in comparison with the corresponding German programme. Only the adoption in peace of a war-system of production, which was excluded by a current Cabinet ruling on the subject, would have avoided this.

Scheme "J" may be regarded as the first expansion programme to be based on calculated estimates of complete strategic requirements(1). In it our fighter strength was related to "the extent, importance and vulnerability of the areas to be defended" while the Coastal and Army Co-operation squadrons were planned to be adequate to perform their respective tasks of maritime and military co-operation.

In C.P. 316(37), dated 15th December 1937, the Minister for the Co-ordination of Defence, basing his views on financial stringency, accepted only the proposed fighter increases in the M.A.F. He rejected the overseas increases and, while accepting the principle that the striking force might be reasonably increased, suggested that the provision for the reserves should be reduced to allow the arrangements for increasing war potential to be increased. These suggestions were accepted by the Cabinet on 22nd December 1937 and necessitated the production of Scheme "K" which was "J" cut down.

(1) Calculated estimates of the numbers of aircraft required for shipping protection and naval co-operation in case of war with Japan or alternatively for a combined war against Japan and Germany were only made available by the Joint Planning Sub-Committee on 11th October 1937. (C.O.S. 621).

TABULAR STATEMENT.

Date of proposals and authority	Cabinet Approval	M.A.F.		Overseas		Total M.A.F. & Overseas		F.A.A.		Composition of M.A.F. (Bracketed figures indicate Non-regular Sqns.)				Increases in Sqn. I.E.	Provision for Reserves
		Sqns.	a/c	Sqns.	a/c	Sqns.	a/c	Sqns.	a/c	Type	Total Sqns.	(I.E)	Total a/c		
12.10.37. D.P.(P)12. Air Staff Memo. "The Requisite Standard of Air Strength".	Referred back for modification on 22.12.37. Cab. 48 (37)	154 + 4 TD.	2331 + 56	45	644	203	3031	50 (See D.P.(P)3; for comparison only)	650	F	38(9)	14	532	+ 3 (+9) + 2 Converted to G.R. @ 21 I.E.	War reserves of a/c for M.A.F. sqns. were to be provided on the basis of the numbers of a/c required (at estimated wastage rates) to maintain the first-line sqdns. during the first four months of war. War reserves for overseas sqns. were also suggested for the first time.
										MB	26(7)	21	546		
										HB	64	14	896		
										TB	-	-	-		
										GR	9	21	189		
										FB	6	6	36		
										AC	11(4)	12	132		
											154(20)		2331		
										TD*	4		56		
											159(20)		2387		
										Included an Air Striking Force of 90 Sqns. of 1442 a/c. (* Trade Defence Sqns. Location unspecified).					

SCHEME "K" (for completion by 31.3.41)

DESCRIPTION

Scheme "K" was Scheme "J" cut down according to the suggestions made to the Air Staff by the Minister for the Co-ordination of Defence on 4th November, 1937. The "strategical balance" of the air forces proposed in Scheme "J" was thereby forfeited.

Its main features were:-

(1) The overseas increases of Scheme "J" were dropped.

(2) Scheme "J" bomber programme was cut and related to the estimated strength of the German long-range bomber strength in the Summer of 1938.

(3) The provision for war reserves was reduced but, in compensation, a substantial sum was earmarked for expenditure on arrangements for increasing war potential and a further sum was held in suspense for application either to additional war potential or to the restoration of some proportion of the cut in war reserves, in the light of experience.

The scheme did not come before the Cabinet until 14.3.38, two days after the German entry into Austria. It was clear by then that it would need to be accelerated.

N.B. The effect of the reduction in the scale of war reserves would have had the effect, as pointed out in D.P.(P)16, of reducing our actual war first-line bomber strength and thus have imposed an added strain on our fighter defences. A striking force with a peace-time establishment of 1,350 aircraft with only nine weeks' war reserves would have had to be reduced to rather under 1,000 first-line aircraft in order to continue operating at the same degree of intensity for 16 weeks.

TABULAR STATEMENT

Date of proposals and authority	Cabinet Approval	M.A.F. Sqns.	M.A.F. a/c	Overseas Sqns.	Overseas a/c	Total M.A.F. & Overseas Sqns.	Total M.A.F. & Overseas a/c	Composition of M.A.F. (Bracketed figures indicate Non-regular Sqns.)	Increases in Sqn. I.E.	Provision for Reserves
21.1.38. CP.24(38) Appendix IV.	Considered on 14.3.38. (referred back for acceleration. (Cab. 13 (38))	145	2305	39	490	184	2795	Type / Total Sqns. / (I.E.) / Total a/c: F 38(9) / 14 / 532 MB 16 / 24 / 384 MB (3) / 16 / 48 HB 58 / 16 / 928 GR 9 / 21 / 189 GR (4) / 14 / 56 FB 6 / 6 / 36 AC 11(4) / 12 / 132 145(20) / 2305 Included an Air Striking Force of 77 sqns. of 1360 a/c.	+ 3 a/c - 5 a/c + 2 a/c No previous provision.	Except for the fighter and trade protection sqns. (GR and FB) which were given full war reserves, the war reserves of aircraft were cut from the previously accepted figure of 16 weeks' coverage to a new figure of 9 weeks' reserve which was fixed arbitrarily on purely financial grounds. Even these limited reserves were not to be achieved till late in 1941.

SCHEME "L" (for completion by 31.3.40.)

DESCRIPTION

Scheme "L". The fighter strength, as compared with Scheme "K", was slightly increased and the whole programme was accelerated by a year by abandoning the principle of "no interference with the course of normal trade" (Cabinet conclusion of 22.3.48.) Cab.15(38). Double-shifting was to be employed throughout the aircraft industry. Even so Scheme "L" would be two years behind the corresponding G.A.F. programme.

The Minister for the Co-ordination of Defence and the Chancellor of the Exchequer opposed the scheme because it could not be reconciled with the Cabinet ruling of 16th February 1938 (Cab.5(38)) that the combined figure of £1,570 millions should not be exceeded by the three Defence Ministries during the years 1937-41.

After the scheme had been considered by a Cabinet Committee of four, the Air Ministry was able to revise the scheme, disregarding financial considerations and basing its proposals on what the country's industrial capacity could turn out in the next two years. The final programme required the production of some 12,000 aircraft by April 1940 and consultations with the aircraft industry revealed that 4,000 aircraft could be produced in the first and 8,000 aircraft in the second year.

It was in this form that Scheme "L" secured Cabinet approval on 27th April 1938.

The adoption of this scheme virtually involved the abandonment of the attempt to achieve even a shop-window "parity" with the G.A.F. To have achieved parity with estimated German forces by 1.4.40. would have involved the addition of 13 heavy bomber squadrons and 7 fighter squadrons to Scheme "L" to yield a total first-line strength of 2,693 aircraft and an Air Striking Force of 86 squadrons of 1,560 aircraft. (Air Staff Note, dated 28.5.38.).

TABULAR STATEMENT

Date of proposals and authority	Cabinet Approval	M.A.F.		Overseas		Total		Composition of M.A.F. (Bracketed figures indicate Non-regular Sqns.)				Increases in Sqn. I.E.	Provi:
		Sqns.	a/c	Sqns.	a/c	Sqns.	a/c	Type	Total Sqns.	(I.E.)	Total a/c		
1.4.38. C.P.86(38) Memo. by S. of S. for Air, annexed.	Referred to a Cabinet Ctte. of 4 on 6.4.38. - finally approved on 27.4.38.	141	2373	39	490	180	2863	F	38(9)	16	608	+ 2 a/c	Reserves on same scale as in Scheme "K" - except that they were to be available by the end of March 1940. It was estimated that by 31.3.39. there would be little except the immediate reserve behind the first-line sqns.
								MB	23	24	552		
								MB	(3)	16	48		
								HB	47	16	752		
								GR	9	21	189		
								GR	(4)	14	56		
								FB	6	6	36		
								AC	11(4)	12	132		
									141(20)		2373		
								Included an Air Striking Force of:- 73 Sqns. of 1352 a/c					

SCHEME "M" (for completion by 31.3.42.)

DESCRIPTION

Scheme "M" which incorporated most of the still outstanding items of previous expansion schemes, was drawn up under the compelling influence of the Munich crisis.

Its main features were:-

(1) the concentration on building up the strength of the fighter forces of the M.A.F. whose needs were to be given priority. Its squadrons were to be equipped with Whirlwinds, Tornados and Typhoons.

(2) the re-interpretation of the desired equality in striking power with Germany as the ability to "deliver at least an equal load of bombs at the required range". This led to the concentration of bomber production on the large high-performance heavy bombers of the Stirling, Halifax and Manchester types which had been under development since 1936. All the medium bomber squadrons of the M.A.F. were eventually to be rearmed with heavy bomber types at 16 I.E.

In C.P.218(38) the S. of S. for Air had suggested the placing of immediate orders for 1,850 fighters, 1,750 heavy bombers and 2,400 other types and that these orders should be repeated later. Authority for the first orders was given by stages - the Cabinet agreed on 7.11.38. to the placing of orders for 1,850 fighters, orders for the heavy bombers were sanctioned by the Treasury between January and March 1939 and no difficulty was placed in the way of providing the other types of aircraft.

TABULAR STATEMENT

Date of proposals and authority	Cabinet Approval	M.A.F.		Overseas		Total		Composition of M.A.F. (Bracketed figures indicate Non-regular Sqns.)	Increases in Sqn. I.E.	Provision for Reserves
		Sqns.	a/c	Sqns.	a/c	Sqns.	a/c			
25.10.38. C.P. 218(38)	7.11.38. Cab.53 (38) Approval in principle	163	2549	49	636	212	3185	Type / Total Sqns. (I.E.) / Total a/c F 50(14) 16 800 HB 85 16 1360 TB/GR 2 21 42 GR 7 21 147 GR (4) 14 56 GR/FB 6 6 36 AC 9 (2) 12 108 163(20) 2549 Included an Air Striking Force of:- 85 (HB) Sqns. of 1360 a/c.	-	Every effort was to be made to provide the full reserve requirements in a/c and trained crews in order to prevent the "rolling up" of first-line strength on mobilization. It was, however, difficult to improve the reserve position while the re-equipment with new types was taking place as no reserves could be accumulated until re-equipment of first-line units was complete. The aim was, stated broadly, the provision of substantial reserves for fighter sqns. by 1.4.40. and of substantial but not fully adequate reserves for bomber sqns. by the Summer of 1941.

SUMMARY

PROJECTED COMPOSITION OF METROPOLITAN AIR FORCE UNDER R.A.F. EXPANSION SCHEMES (PRE-WAR)

(Bracketed figures indicate non-regular Sqns.)

Scheme	Total Striking Force		Total Fighter Force		Total Coastal Force		Total Army Co-op. Force		Total M.A.F.		For completion by	Air Staff Estimates of Corresponding German Air Force Programme		Date of Completion
	Sqns.	a/c	Sqns.	a/c	Sqns.	a/c	Sqns.	a/c	Sqns.	a/c		Total G.A.E.	Total German Striking Force	
"A"	43(8)	500	28 (5)	336	8	64	5	60	84	960	31.3.39.	?	?	
"C"	70(11)	840	35 (5)	420	13	162	5	90	123	1512	31.3.37.	1512	800/950	31.3.37.
"F"	70(11)	1022	30 (5)	420	13	162	11(4)	132	124	1736	31.3.39.	1572	840/972	31.3.37.
"H"	87 (7)	1631	34 (9)	476	13	183	11(4)	132	145	2422	31.3.39.	2500	1700	31.3.39.
"J"	90 (7)	1442	38 (9)	532	19/	281	11(4)	132	158	2387	Summer '41	3240*	1458*	Dec. 39.
"K"	77 (3)	1360	38 (9)	532	19(4)	281	11(4)	132	145	2305	31.3.41.	2700	1350	Summer 38
"L"	73 (3)	1352	38 (9)	608	19(4)	281	11(4)	132	141	2373	31.3.40.	4400	1950	April 1940
"M"	85	1360	50(14)	800	19(4)	281	9(2)	108	163	2549	31.3.42.			

* Excluding Naval Co-operation Types

/ Includes 4 Trade Defence sqns. (56 a/c) location unspecified.