

A German air gunner in the forward cockpit of a Gotha bomber, holding an oxygen tube in his mouth. (Q 73550)



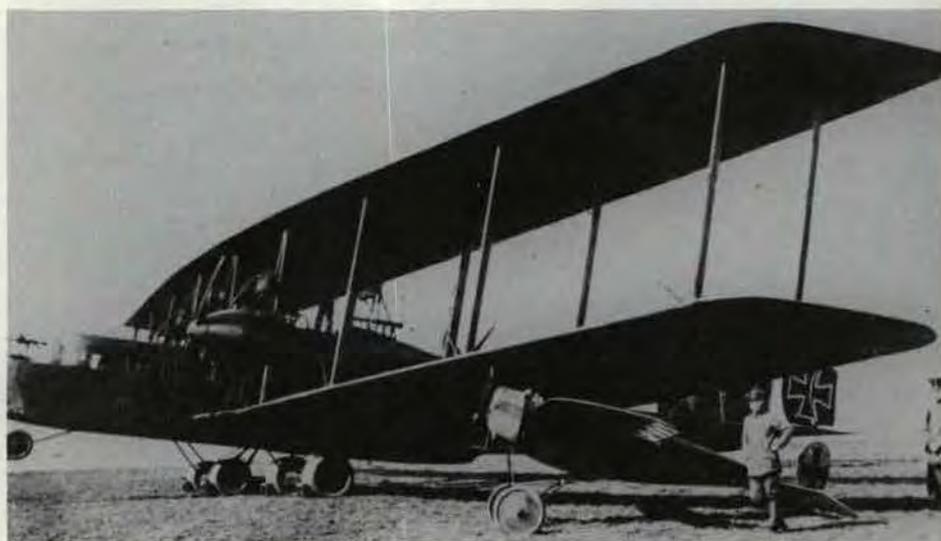
Airmen and groundcrew pose in front of a Gotha bomber.



A balloon apron used for the defence of London, 1917-18. At least two of the 'R' bombers ran into similar aprons but on each occasion the bomber was damaged but not brought down. (Q 61156)



Canadian nurses picking up souvenirs from the German Gotha which was brought down in flames over the Pas de Calais at Mingoval, 1 June 1918. (CO 2741)



A Fokker *Eindekker* single-seat fighter parked under the wing of a Staaken R-VI. Only six 'R' machines were ever used against England and no more than two ever bombed English targets on one night. (*Archiv für Fluggeschichte*)



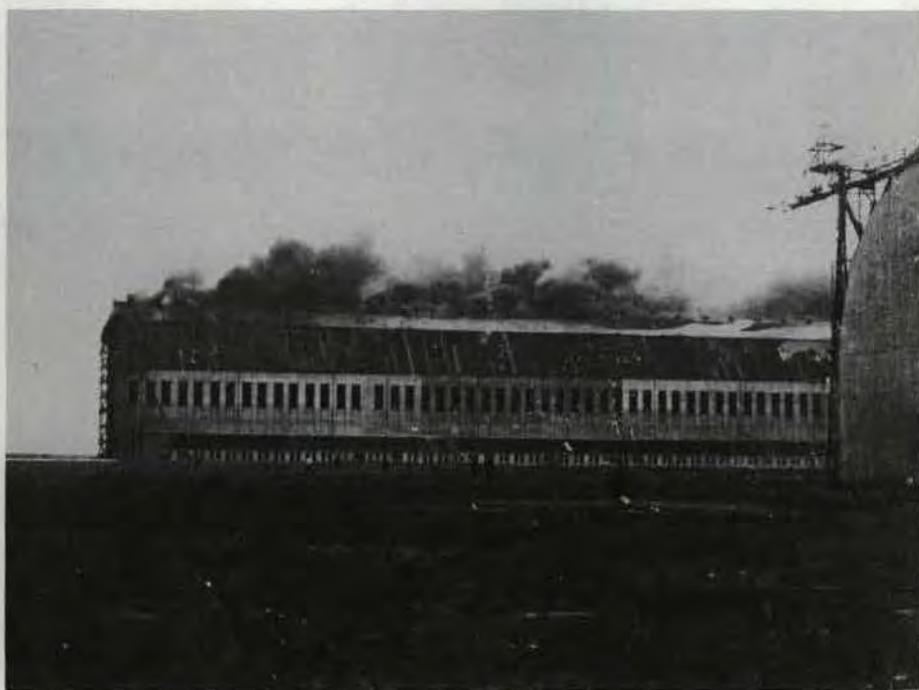
One way to keep fighter aircraft at height in readiness to attempt interceptions of enemy bombers was to suspend them from airships. In a 1918 experiment this Sopwith Camel was slung beneath the R33. (AH 198)



Soldiers search through the debris of the Royal Hospital, Chelsea, hit by the first 1000-kg (2200-lb) bomb to be dropped on Britain, on the night of 16/17 Feb. 1918. (co 3922)



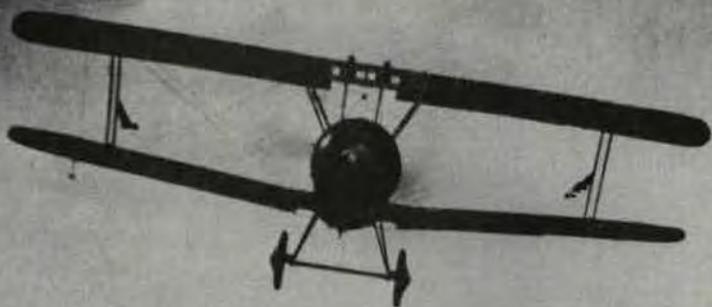
The largest operational aircraft of the First World War, the Staaken R-VI, could deliver a 1000-kg bomb against English targets.



The zeppelin shed at Tondern burning after the July 1918 attack by six Sopwith Camels – one flown by F/L Stephen Dawson of St John, NB – from HMS *Furious* which destroyed L 54 and L 60. Dawson was one of the four pilots who landed in Denmark after the raid; he was killed in action on 10 August. (Q 47941)



L 70 was destroyed by Maj. Egbert Cadbury and Capt. Robert Leckie on the night of 5 Aug. 1918. (Q 58479)



A Sopwith Camel modified for night-fighting. Pilots using standard Camels found that the muzzle-flashes from the twin Vickers guns mounted over the engine cowling, directly in front of the pilot, 'blinded' them. (RE 64-1186)



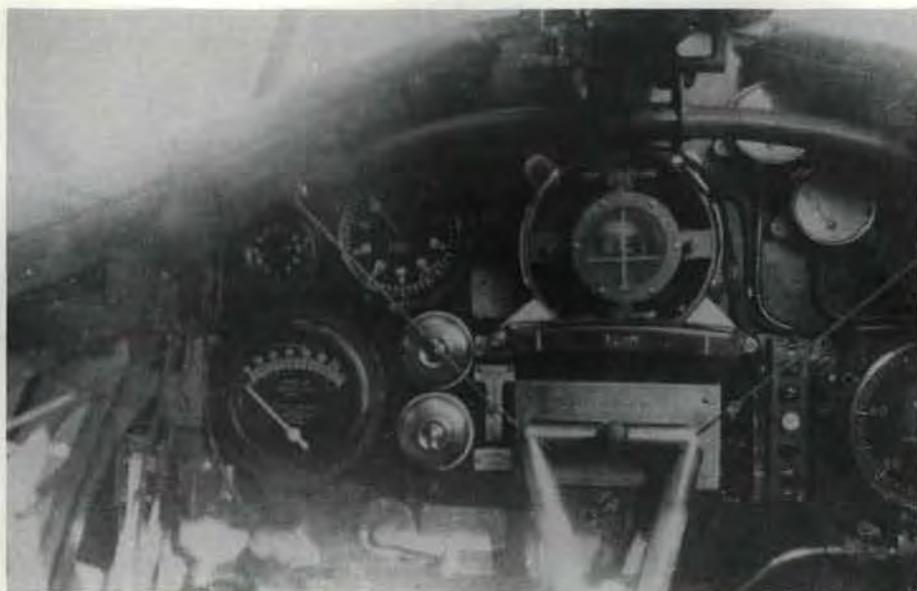
Pilots of 44 (Home Defence) Squadron which pioneered the use of single-seat night fighters, pictured in front of one of the squadron's Sopwith Camels in the winter of 1917/18. Squatting, second from right in the front row, is Capt. A.E. Godfrey, MC, of Vancouver. (RE 21010-1)



The Sopwith 1½ Strutters of 3 (Naval) Wing, RNAS – single-seat bomber and two-seat fighter variants – lined up at Ochey, ready for a raid. (PMR 73-531)



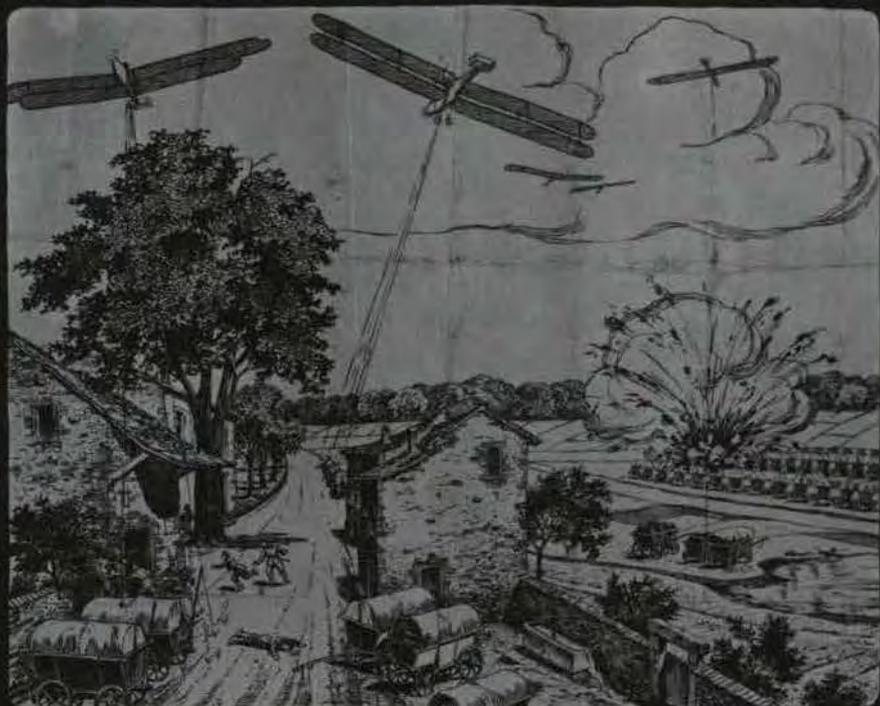
Officers of 3 (Naval) Wing at Luxeuil-les-Bains in late 1916. Seated in the centre are Wing Capt. W.L. Elder and Wing Commander R. Bell-Davies, VC. All of the officers around them are Canadians, with three exceptions. (RE 19562)



This picture of the instrument panel of the Sopwith 1½ Strutter flown by F/S/L R.F. Redpath of Montreal on the Oberndorff raid of October 1916 shows how limited were his aids to night navigation. The only relevant instruments are a compass, clock, and altimeter. (RE 20962)



Ottawa F/S/L Charles Butterworth's Sopwith 1½ Strutter bomber in German hands on Freiburg airfield after the Oberndorff raid of 12 Oct. 1916. (RE 64-1498)



**Hier sehen Euch  
feindliche Flieger!  
Hier dürfen  
Fahrzeuge nicht halten.**

'Here enemy airmen can see you - transport should not halt here' (Q 65529)



Two members of 3 (Naval) Wing at Luxeuil-les-Bains, 1916. On the left F/S/L Lord Tiverton, who would become a devoted advocate of 'terror bombing' as an Air Staff officer in 1918. (PMR 73-518)



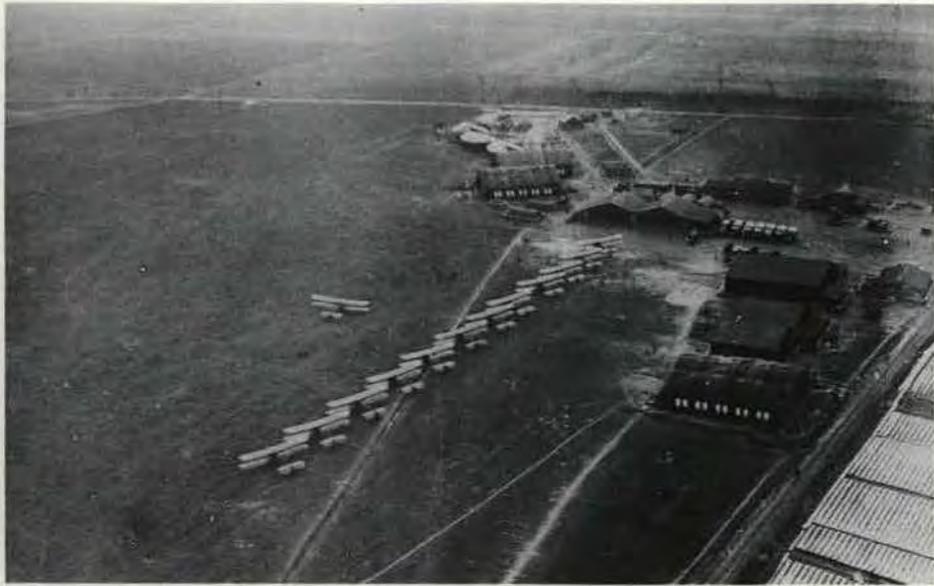
Bomb damage inflicted on a hangar and a German aircraft near Ghent 1917 (Q 109949)



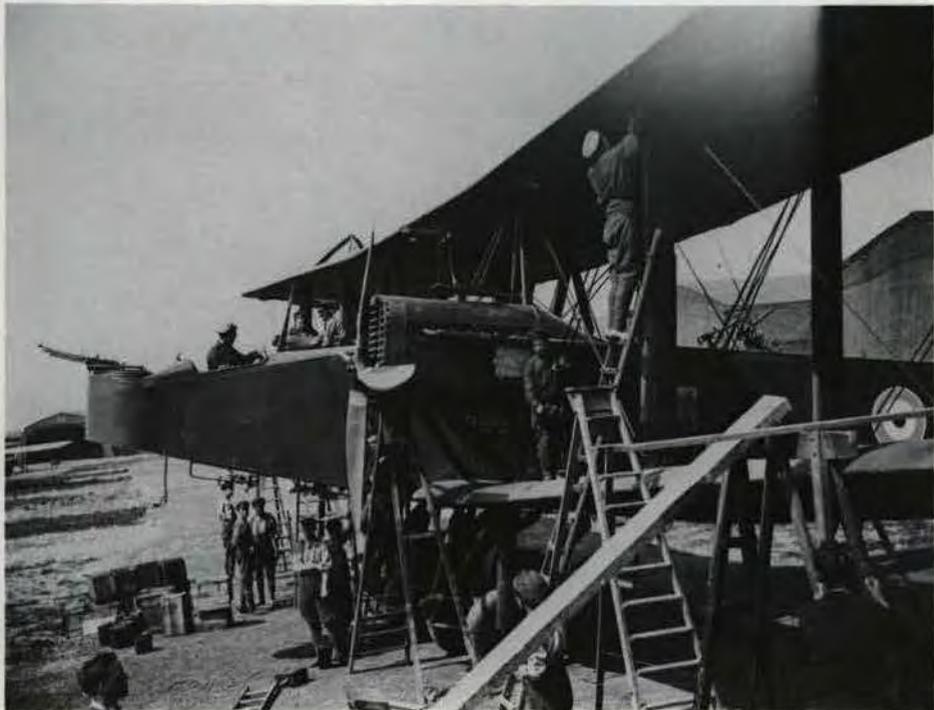
Maj.-Gen. Hugh Trenchard in 1918  
(PMR 80-270)



Handley Page O/100 bombers at one of the Dunkirk airfields, 20 April 1918 (AH 553)



FE 2b night bombers of 149 Squadron newly arrived in France, 1 June 1918 (Q 11552)



Air mechanics working on a Handley Page 0/400 bomber (Q 23610)



Bombing up an FE2b of 149 Squadron in preparation for a night raid. This picture was taken on 1 July 1918 when at least six Canadians were flying with the squadron. (AH 436)



Officers of 207 Sqn RAF, a unit of Trenchard's Independent Force, photographed August 1918. This group illustrates the great variety of RNAS, RFC, and RAF uniforms in vogue at the time. Seated, hatless in flying boots, is Captain Gordon Flavelle of Lindsay, Ont. (Q 12103)



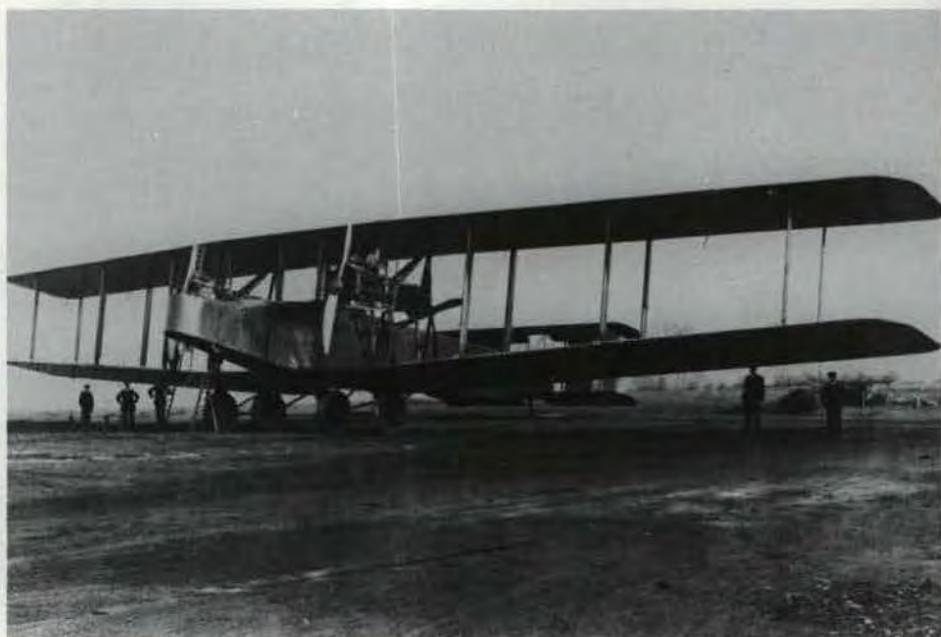
A Handley Page O/400 bomber of the Independent Force at Ligescourt, France, 29 Aug. 1918. The device below the Lewis gun in the nose is a bomb-sight: held by a safety strap the observer leaned out from his cockpit to use it. (AH 437)



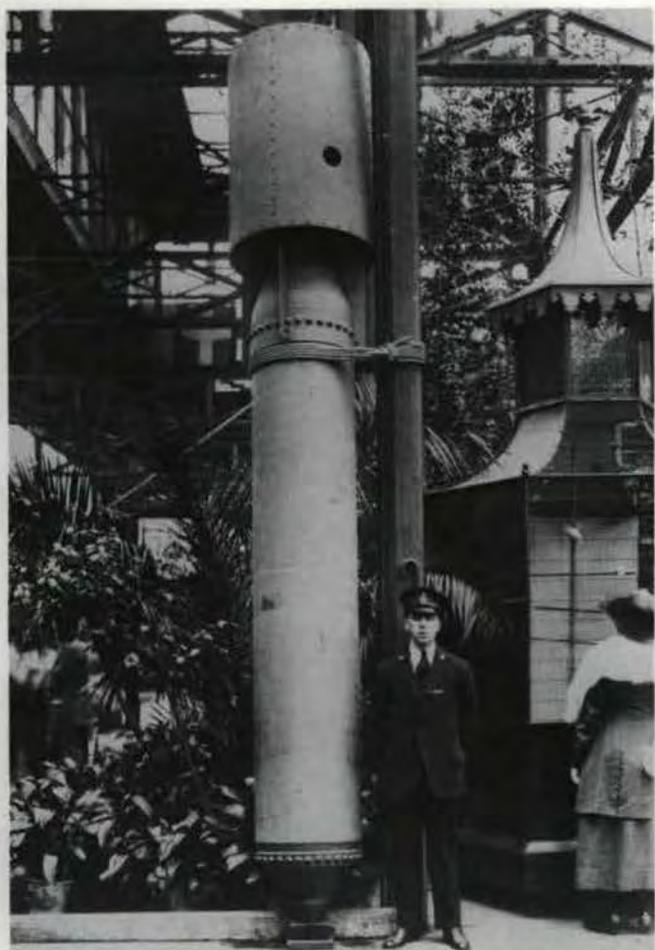
On the night of 28/29 Sept. 1918 bombers of the RAF's Independent Force dropped seventeen tons of bombs on Thourout railway junction. Some buildings (on the right) were still burning when this picture was taken. (Q 60301)



A prototype v1500 Handley Page bomber photographed in November 1918 (PMR 71-401)



Another view of a Handley Page v1500 bomber (AH 502)



This 3300-lb 'blockbuster' was designed to be carried by the Handley Page v1500.  
The war ended before the v1500s became operational and the bomb was never used.  
(AH 455)



The officers and men of the Independent Force's No 27 Group, under the command of Col. R.H. Mullock of Winnipeg (inset), line up in front of a Handley Page v1500 bomber at Birchall Newton. (RE 204-31)



Corporal R.H. Mullock of Winnipeg, seen here serving with the Canadian Field Artillery on Salisbury Plain in late 1914, would become Canada's top-ranking operational airman and the RAF's leading bomber commander in 1918. (PMR 71-389)



Col. R.H. Mullock of Winnipeg (sitting) with Maj. J.W.K. Allsop, his British chief of staff in No 27 Group, photographed at the end of the war when they were training to raid Berlin with Handley Page v1500s. (PMR 71-406)

## Introduction

The idea of 'victory through airpower,' usually attributed to such interwar theorists as the Italian general Giulio Douhet, was in fact born during the 1914-18 struggle. Indeed, at the very inception of the air age the notion of using flying machines as platforms from which to bomb an enemy nation-state into submission had quickly taken hold. In the hands of a brilliant fantasist like H.G. Wells the idea had been developed so tellingly that it affected the social psychology of the era, but the gulf between Wells' imaginary armadas of the air and the actual state of aviation technology was enormous. It was hardly surprising that no military staff gave serious attention to the subject before 1914. From the first days of manned flight the idea of strategic bombing had been discussed, luridly by some, apprehensively by others, and professionally by a few. All, however, wrote about it as an inevitable consequence of the harnessing of the flying machine to war. So rapidly did the air weapon evolve that by late 1914 the first long-distance raids had taken place. By the end of the war the use of aircraft to achieve strategic goals had become settled policy for all major belligerents. Within eighteen months of the outbreak of war the British, French, and Germans had all espoused forms of strategic bombing; and before the war was over some strategic thinkers, horrified by the catastrophic battles of attrition on the Western Front, went so far as to propose strategic bombing as an alternative war-winning strategy.

The term 'strategic bombing' was used no more precisely during the First World War than it has been subsequently. Often, any bombing at some distance from the fighting fronts was called 'strategic,' as if distance alone was the determining characteristic. Conversely, some theorists of airpower wished to confine the use of the term to that form of bombing intended, by itself, to bring victory. Although this view has the virtue of clarity, it is a considerable over-simplification, as the authors of the British official history of strategic bombing in the Second World War have pointed out. In their analysis, one that depends heavily upon the much more extensive experience of bombing operations upon which they were able to draw, there are three ways in which the term may appropriately be used.

The first use is that directly connected with the operations of land and sea forces. Almost from the beginning of the First World War air bombing was used tactically to strike at ammunition dumps, troop concentrations, lines of communication, and shipping. But when aircraft came to be used to attack not ammunition dumps

but ammunition factories, not ships but shipyards, they were then being employed strategically – that is, they were contributing to the strategic objectives of the armies and navies of which they were an extension. The air battle, however, can be thought of as distinct from the land and sea battles, as the separate struggle of air forces with its own distinct tactical and strategic levels. A second form of strategic bombing, therefore, is that concerned with attacks on the resources upon which enemy air strength is based. Strategic bombing in this sense was unknown during the First World War.

The third and ultimate dimension of strategic airpower is that in which bombing is conceived as the primary means of achieving victory. The advocates of strategic bombing in this sense have always rested their case upon the speed, range, and flexibility of the air weapon, its allegedly relative invulnerability to defensive measures, and the accuracy and destructive power with which high explosive and incendiary bombs could be dropped upon their targets. In more recent times the introduction of nuclear bombs has notably strengthened their case. By devastating blows at vital political centres, key industries, and, above all, the will of the enemy nation, the independent bombing force – or so its supporters have contended – can smash or fatally weaken an enemy's capacity to continue the fight.

The belief was strong among many proponents of the air weapon during the First World War that this last kind of bombing was the proper role of air forces. It was a belief without much relationship to technological reality. From early 1915 the Germans waged a strategic air offensive against the British homeland, first by night-raiding zeppelins of the German army and the Naval Airship Division and then, in 1917–18, with multi-engined aeroplanes. Enthusiastic German airmen hoped to achieve spectacular and even decisive results, but their high command never sought or expected more than the diversion of some British air and ground strength to the task of defence. The use of the air weapon in this manner had the strategic aim of assisting the ground forces in the main battle, and within that limit certainly enjoyed some success.

The British involvement in strategic bombing was pioneered by the Royal Naval Air Service, as has been shown in Part Two, 'Admiralty and the Air.' It was natural for the navy to think strategically about airpower and how it might be deployed with maximum flexibility; such modes of thought were almost conventional in a service historically charged with world-embracing duties. The RNAS, however, did not always subordinate bombing to the strategic aims of the navy. The attacks against German industry conducted from French bases in 1916–17 by 3 Wing RNAS, though ostensibly designed to damage industries producing material for the war at sea, were often launched against targets based upon French command priorities that had little or no relation to the war at sea.

The production of aircraft and engines for bombing purposes by the RNAS and the mounting of bombing offensives against Germany from Luxeuil and Dunkirk caused a series of ruptures between the naval air service and the Royal Flying Corps. This inter-service friction, combined with public demands for retaliation for the German raids upon England and the vision held out by airpower proponents of victory through bombing rather than the attrition-battle on the Western Front, brought about the amalgamation of the RFC and the RNAS into the Royal

Air Force and the creation of a special formation of the RAF called the Independent Air Force. The impossible task assigned to the IAF was to bomb Germany into submission by obliterating its war industries and by breaking the enemy's will to fight.

To a remarkable degree Canadians were linked with the beginnings of the strategic use of airpower during the First World War. Though relatively few in numbers, they contributed more than their share of victories to the battle against German zeppelins, a battle which saw the evolution of the first systematic defence against bombing attack. There were many Canadians with the RNAS at Dunkirk; 3 Wing at Luxeuil was mainly Canadian in composition; and in the sustained bombing offensive against Germany carried out by the Independent Air Force in 1918 Canadians served in significant numbers.

## The Air Defence of Britain

The history of German air raids on England and Scotland during the First World War is a classic example of the achievement of significant military results through the use of relatively insignificant forces. The raids caused neither heavy civilian casualties nor important damage, yet so powerful was the public demand for stronger air defences that the politicians yielded, and substantial air and ground forces were withheld from the fighting fronts. But the German raids had other less calculable consequences. Adverse public criticism of the flying services, not all of it ill-informed, led to technological and tactical improvements in defensive methods of long-term importance. Moreover, the demand by public and politicians alike for retaliation against German raiding was a direct cause of the creation of the Royal Air Force, conceived as an instrument for independent strategic bombing.

The rigid airship, pioneered by Count Ferdinand von Zeppelin, was the chief weapon employed against Britain until mid-1917. Before the war the airship's potential as a bombing vehicle was hardly considered. Both naval and army airships were regarded as scouting weapons; the German Naval Airship Division, which was to carry out most of the raids against Britain, received no bombs until October 1914.<sup>1</sup> Yet the popular press held out to the German people exaggerated hopes for the destruction of England from the air, and senior military authorities were not exempt from such illusions. In late August 1914 *Konteradmiral* Paul Behncke, Deputy Chief of the Naval Staff, proposed airship raids on the London docks and the Admiralty; he believed that the resultant panic would possibly 'render it doubtful that the war can be continued.' The Army Chief of Staff, *General* von Falkenhayn, also requested permission to use military airships against Britain. The 'very serious scruples' of the Kaiser against bombing gave way on 10 January 1915, when he approved the bombing of docks and military establishments along the English coast and on the lower Thames.<sup>2</sup> Following the first raid of 19-20 January, greeted enthusiastically in the German press, the imperial scruples were further diminished. On 12 February 1915 an imperial order was issued:

1. His Majesty the Kaiser has expressed great hopes that the air war against England will be carried out with the greatest energy.

2. His Majesty has designated as attack targets: war material of every kind, military establishments, barracks, and also oil and petroleum tanks and the London docks. No attack is to be made on the residential areas of London, or above all on royal palaces.<sup>3</sup>

Such precise targetting instructions reflected the unbounded optimism then existing in German military circles, for almost unfailing inaccuracy was the chief characteristic of all high-level bombing during the First World War.

The terms of reference for the German Naval Airship Division, which remained in force for the rest of the war, were laid down by the Commander of the High Seas Fleet in June 1915. Fleet co-operation and reconnaissance were the division's main functions, but 'operations of the airships against enemy territory from the North Sea airship bases'\* were also included. Though the establishment of the division was fixed at eighteen airships, there were only seven fit for service in early 1915. The largest, L 9,<sup>†</sup> had a trial speed of slightly more than 50 mph and a useful lift of about 25,000 pounds.<sup>‡</sup> In May L 10, the first of a new series, was delivered to Nordholz. A larger and faster type, she had a volume of 1,126,400 cubic feet, a useful lift of 35,000 pounds, a trial speed of almost 58 mph, and an overall length of 536 feet. L 10 could operate up to a ceiling of 11,000 feet.<sup>4</sup>

It should be borne in mind that performance figures for airships, especially those for ceiling and lift, vary considerably with air temperature and barometric pressure. The static lift from the hydrogen-filled gas cells was higher in cool air and in periods of high pressure because of the greater weight of the air displaced. Airship raids, therefore, normally took place during the colder months of the year.

In the course of the twenty airship raids during 1915, 208 persons were killed and 532 injured. The total damage was estimated to be over £800,000, much of it the work of L 13, commanded by *Kapitänleutnant* Heinrich Mathy, on the night of 8-9 September, when incendiaries had started fires in the warehouse district of London. The air defences had been unable to down a single airship; in fact, during the whole year only two pilots had intercepted zeppelins in the course of a raid. Night-landing accidents had taken the lives of three pilots and fifteen aircraft had been wrecked or damaged.<sup>5</sup>

Home defence was a responsibility neither flying service wanted. By September 1915 the Admiralty had secured from the War Office agreement in principle for the transfer of this unwelcome burden from the RNAS to the RFC. Kitchener was deeply reluctant to accept this task for the RFC when 'the army had no aircraft to

\* The main naval airship bases were at Tondern, near the Danish border, Fuhlsbüttel, Nordholz, Wittmundhaven, Hage, and Ahlhorn, near Oldenburg. All except the last named were on or near the North Sea coast.

† German rigid airships came from both the Zeppelin and Schütte-Lanz works, the Schütte-Lanz airship using plywood rather than aluminum in its interior structure. Naval zeppelins were designated L (*Luftschiff*) and were numbered consecutively in order of receipt from the builder. Army zeppelins were designated LZ (*Luftschiff Zeppelin*); they were numbered by adding '30' to the builder's number. Schütte-Lanz airships were designated SL plus the builder's number by both services.

‡ Useful lift meant the load (crew, stores, ballast, fuel, armament, and bombs) that could be carried in addition to such fixed weights as the structure, engines, and gondolas.

spare, while more calls were being made for aircraft in France,' and when anti-aircraft guns were in limited supply.<sup>6</sup> The responsibility for this unwanted child finally passed to the RFC as a result of a decision of the Cabinet War Committee in February 1916. The two services were to co-operate thus:

- (a) The Navy to undertake to deal with all hostile aircraft attempting to reach this country, whilst the Army undertake to deal with all such aircraft which reach these shores.
- (b) All defence arrangements on land to be undertaken by the Army which will also provide the aeroplanes required to work with the Home Defence troops and to protect garrisons and vulnerable areas, and the Flying Stations required to enable their aircraft to undertake these duties.
- (c) The Navy to provide the aircraft required to co-operate with and assist their Fleets and Coast Patrol Flotillas and to watch the Coast, and to organise and maintain such Flying Stations as are required to enable their aircraft to undertake these duties.<sup>7</sup>

This arrangement was not to change, but the artificial 'high water mark' between the responsibilities of the RNAS and those of the RFC could only work well if the two services, and their parent organizations, collaborated closely on such matters as air intelligence and interception tactics. Frequently that was not the case.

The RNAS and the RFC were in disagreement, for example, on the fundamental matter of the place of the aeroplane in defence against airships. The RNAS agreed with a September 1915 report of the Board of Invention and Research which had concluded that night-flying against airships was not only 'ineffective' but costly and dangerous; this judgment reinforced the Admiralty's assessment of the Paris defence system, to the effect that guns, searchlights, and ground observers were the key elements. Sir David Henderson, at a home defence conference with Admiralty representatives on 10 November, was told that 'so far experience had shown that aeroplanes were not at the present time of much use for the defence of a city like London, and therefore no elaborate scheme had been drawn up on the subject.' After the transfer of home defence responsibilities in early 1916, the RNAS curtailed night-flying operations and posted a number of experienced night pilots overseas, a course unanimously recommended by east-coast station commanders.<sup>8</sup> At that time Rear-Admiral Vaughan-Lee, the Director of the Air Service, summed up the position of the RNAS in an internal memorandum: 'Not much importance is attached to flying at night against Zeppelins. It is considered that everything that can possibly be done to meet the Zeppelin should be carried out so long as undue risks to personnel and materiel are not incurred. Moreover, as the Military are undertaking this work on a large scale, it is considered that for public opinion alone the Navy should do a certain amount.'<sup>9</sup> In the light of this succinctly expressed position, it is not surprising that the War Office had already concluded that 'we must be self-supporting.'<sup>10</sup>

The RFC had drawn quite different conclusions from the report of the Board of Invention and Research and from its own experience. The board had recommended that the effectiveness of night-flying aeroplanes should be increased: 'it must be assumed that night flying for war purposes is necessary,' not only because of zeppelins but because 'in the present state of development of aeronautical engi-

neering, the raiding of England by large aeroplanes at night is possible, and it would be imprudent to ignore the fact that it is likely to become a reality within a few months.' RFC planning, tested experimentally during the raid of 13–14 October 1915, was based upon the assumption that defence against the airship called for the co-ordinated use of searchlights, guns, ground observer cordons, and information about zeppelin movements derived from directional wireless equipment, and that the aeroplane was an essential part of this system. Aeroplanes, it was considered, should be stationed in the immediate vicinity of vulnerable areas.<sup>11</sup>

A considerable gap existed between planning and available means in early 1916. Twenty BE2cs, dispersed at ten airfields around London, were the RFC's immediate answer to the German airships. These aircraft were armed with four small bombs and Ranken darts.\* These weapons could only be used by getting above an attacking airship; therefore two-hour standing patrols, at heights up to 10,000 feet, were laid on. At first no RFC airfield sent more than a single aircraft aloft at any one time to carry out these patrols.

Before the RFC had an opportunity to augment its home defence force the German airships began their 1916 campaign. On 18 January *Vizeadmiral* Reinhold Scheer, the new commander of the High Seas Fleet, had approved a plan for diversified raids on the United Kingdom drawn up by *Fregattenkapitän* Peter Strasser, the chief of the Naval Airship Division. Strasser specified three attack zones: England North, from the Tyne to Edinburgh; England Middle, from the Humber to the Tyne; and England South, in which London was the prime target. On 31 January nine airships raided the Midlands. The few aeroplanes that were sent up saw nothing and several crash-landed. Difficulty with the new Maybach 240-hp engines probably caused the loss of L 19, which came down in the North Sea. Much controversy resulted from the action of a fishing trawler, the *King Stephen*, whose captain left the L 19's crew to drown because he feared that if they were taken aboard he and his men would be overpowered. The Bishop of London condoned this action because the Germans had bombed innocent civilians; to the *Frankfurter Zeitung* the bishop was a 'jingoistic hatemonger.'<sup>12</sup>

The bishop's statement was representative of the anger and consternation aroused by the raid – and by the inadequacy of the defences. A week after the raid the Midlands was still 'suffering from shock'; men were refusing to work night shifts and munitions production had dropped. Demands for reprisals on German cities, voiced in Parliament by such members as William Joynson-Hicks, gripped the public mind, though the Convocation of Canterbury denounced retaliation as immoral and barbarous. The Bishop of Bangor, the convocation's only dissenter, believing that all citizens were now combatants, argued that if a hundred aeroplanes 'dropped bombs all over the rich business part of Frankfurt,' zeppelin raids would cease immediately. C.G. Grey, the fire-eating editor of *The Aeroplane*, congratulated the bishop on 'his intellectual honesty and freedom from cant.'<sup>13</sup>

\* Two 16-lb incendiaries and two 20-lb Hales high-explosive bombs were provided. The Ranken dart was equipped with tail vanes designed to spread on release, so that the dart, when it penetrated the envelope of an airship, would be held long enough for the charge in the head to detonate inside. The darts were carried in containers of twenty-four.

The most powerful advocates for a policy of retaliation were to be found within the Admiralty. Towards the end of the first raiding period of 1916, Vaughan-Lee submitted a memorandum in which he argued that the best response was 'an organised and systematic attack on the German at home,' which, somehow, would reduce zeppelin activities and at the same time have 'an immense moral effect on Germany itself.' He proposed that 'a definite policy of Retaliation be laid down and carried into effect without any further delay,' that French bases for long-range operations be obtained with the co-operation of that government, and that pilots, 'if necessary ... taken from the defence stations on the Coast,' be trained for this work.<sup>14</sup> Vaughan-Lee's memorandum set in train a bombing offensive of 3 Naval Wing from Luxeuil and Ochey, an offensive that, in part at least, derived from the unhappy experience of the RNAS with home defence and the belief that the best reply to the airship was to employ the aeroplane as an offensive weapon.

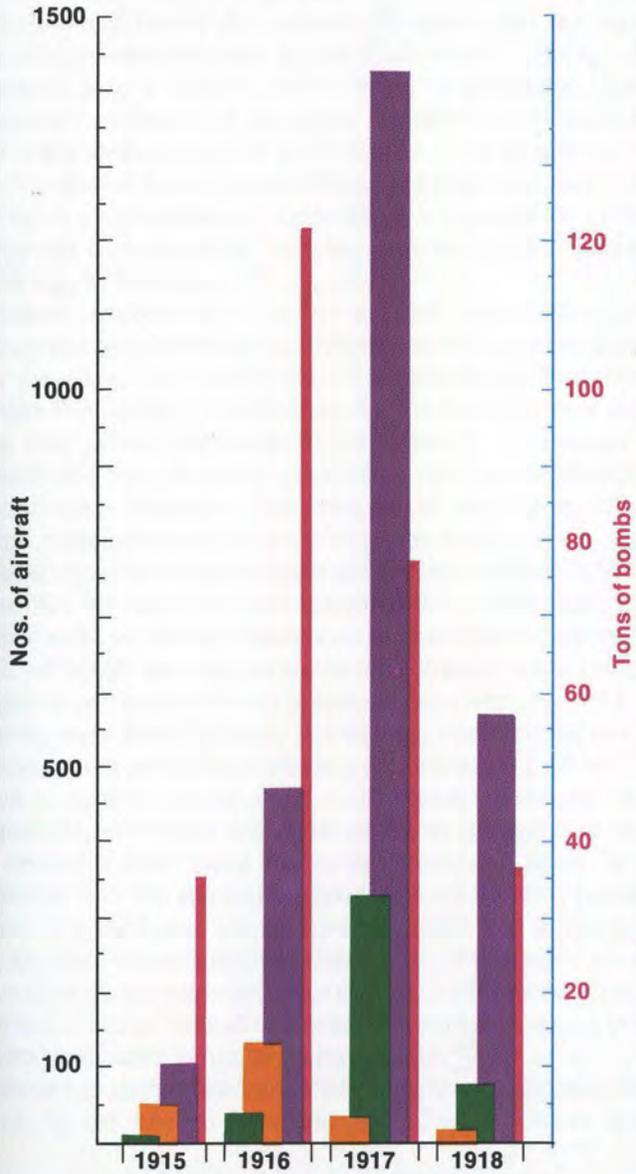
Meanwhile, the defences had claimed a victim, though not before a raid on 5-6 March had set off rioting in Hull and caused the mobbing of an RFC officer in nearby Beverley. On 31 March six airships crossed the English coast at or close to the naval airfields at Felixstowe and Great Yarmouth. Not an aeroplane stirred because of a communication breakdown. Though London was the target, five of the airship commanders decided that the air temperature was too high to allow the bombing of the capital from a sufficiently safe altitude. Only L 15 pressed on, to be caught by the searchlights, attacked by an RFC pilot who dropped his Ranken darts with no apparent effect, and finally to come down off the mouth of the Thames as a result of anti-aircraft fire.<sup>15</sup>

London's defences were becoming more formidable, but progress elsewhere was slow. On the night of 1 April L 11 worked its way down the east coast without opposition, bombing Sunderland and Middlesbrough. Flight Sub-Lieutenant Grant Gooderham of Toronto, flying from Whitley Bay, was one of those sent out to intercept the zeppelin. Having no specific information on L 11's flight path or height, Gooderham flew down the coast at 8000 feet, just a few minutes, had he known it, behind the zeppelin, but he saw nothing. Similar frustration attended the work of pilots during further raids on northern England and Scotland on 2 and 24 April and 2 May.<sup>16</sup> Most naval air stations, however, generally attempted to combine normal scouting activities with anti-zeppelin patrols, as a report from RNAS Scarborough illustrates: 'During fine weather, machines are carrying out special flights to Flambro Hd [sic] leaving at dusk and returning after dark. Seven flights have been made, machines arriving over the Hd at heights from 3000 ft. to 5000 ft. Nothing has been seen of hostile aircraft, but from reports received, one machine missed a Zeppelin by 10 Mins. If these patrols can be kept up it is quite possible one may be caught, but more machines and Pilots are urgently required.'<sup>17</sup> Chance encounters were always possible, but patrols by the clock, flown at low altitudes, ending at an hour when zeppelin activity normally was beginning and bearing no relation to intelligence reports of airship movements, showed that little had been done to co-ordinate the work of the two air services in home defence.

During this first raiding period of 1916 most Canadians concerned with home defence were to be found on RNAS stations. Many of them were at Dover and Felixstowe; others were scattered from Dundee to the south coast. Most of their

RATIOS OF SORTIES FLOWN BY GERMAN RAIDERS AND BRITISH DEFENCE AIRCRAFT

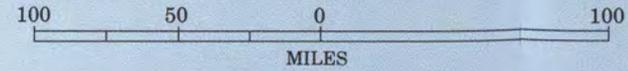
Sorties by Home Defence aircraft  
 Airship sorties (From British records)  
 Aeroplane sorties (From British records)  
 Weight of bombs dropped (Brit. estimate)



Note: Where uncertainty exists regarding the number of enemy aircraft known to have crossed the English Coast, the number used, is the same as the number shown to have started.

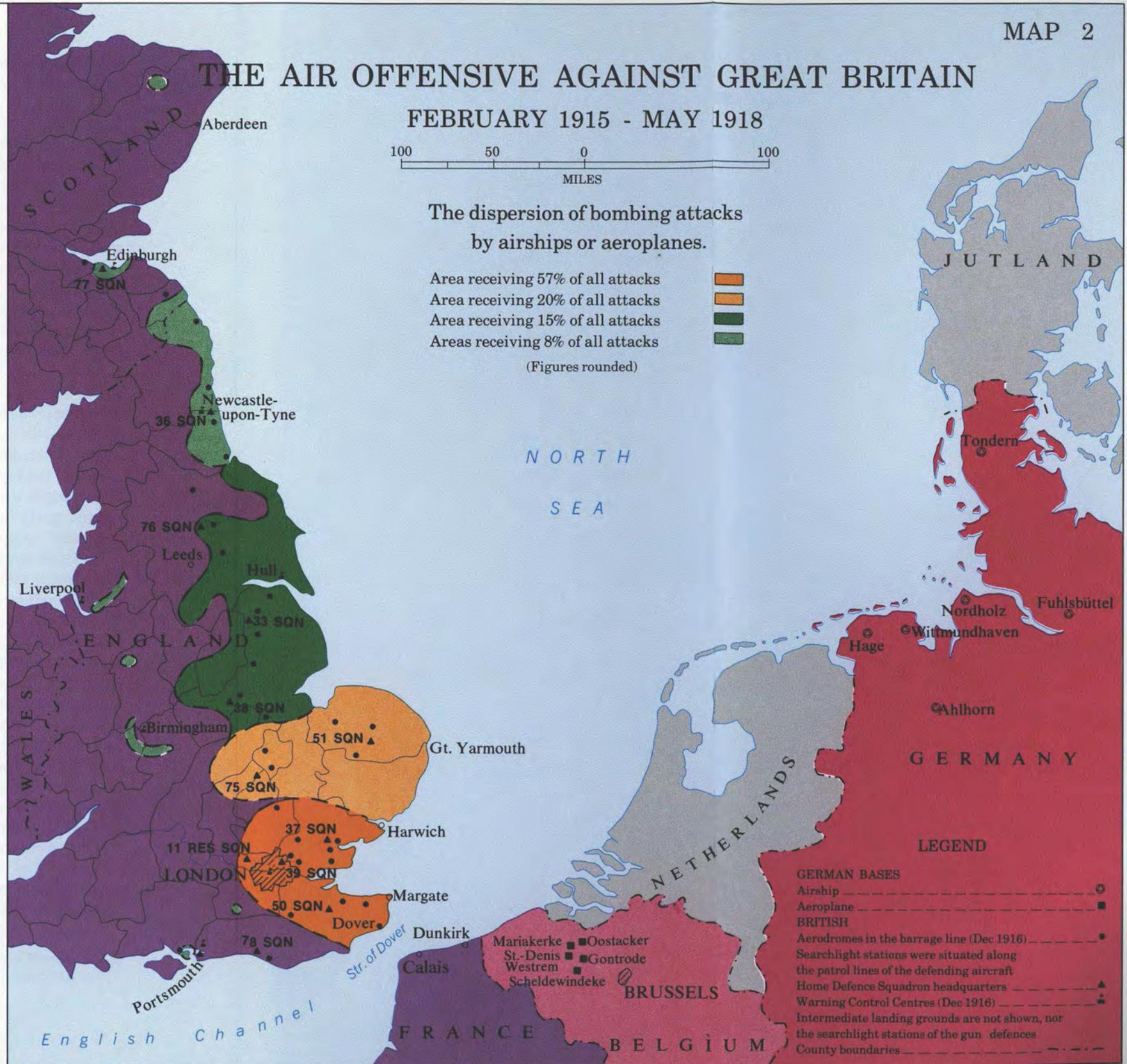
THE AIR OFFENSIVE AGAINST GREAT BRITAIN

FEBRUARY 1915 - MAY 1918



The dispersion of bombing attacks by airships or aeroplanes.

Area receiving 57% of all attacks  
 Area receiving 20% of all attacks  
 Area receiving 15% of all attacks  
 Areas receiving 8% of all attacks  
 (Figures rounded)



LEGEND

GERMAN BASES  
 Airship (circle with dot)  
 Aeroplane (square with dot)  
 BRITISH  
 Aerodromes in the barrage line (Dec 1916) (circle with dot)  
 Searchlight stations were situated along the patrol lines of the defending aircraft (circle with dot)  
 Home Defence Squadron headquarters (triangle with dot)  
 Warning Control Centres (Dec 1916) (square with dot)  
 Intermediate landing grounds are not shown, nor the searchlight stations of the gun defences  
 County boundaries (dashed line)

flying time was taken up with other duties and it was only rarely that they joined in the hunt for zeppelins. Six Canadians, all with 33 Squadron, were on the RFC's home defence establishment in the same period.\*

In May and June the Air Board's review of recent home defence operations enumerated a number of continuing weaknesses making clear the fact that neither air service had given a high priority to the function. The RFC, which had earlier estimated that it needed 138 machines for home defence, could muster only seventy-five and lacked the pilots to fly those; and the squadrons allocated to home defence were still seen as part of the corps' training organization. General Henderson, once a believer in the value of aeroplanes against zeppelins, now thought their usefulness at night was 'somewhat problematical,' and preferred to regard home defence aircraft as a reserve to be transferred to France on short notice if required. Lord Curzon offered the judgment that 'home Aerial Defence rested more on guns than on Aeroplanes' and concurred in General Henderson's view 'on the understanding, however, that the transfer proposed should only be made in case of emergency.'<sup>18</sup>

Significant improvements in the strength, organization, and methods of the RFC were nevertheless made, partly through the initiative of Brigadier-General W. Sefton Brancker, the Director of Air Organization. Brancker had already taken issue with Henderson's views before the Air Board; he now took the lead in organizing a War Office conference to revise the RFC's strategic approach to home defence in the light of recent experience. The new defence system evolved after this conference discarded the principle of static protection of likely targets, although these continued to be shielded by belts of anti-aircraft guns. Instead of stationing squadrons close to target areas (some of them in the west of England), a 'barrage line' of aeroplanes and searchlights was to be built up along the east and southeast coast to intercept raiders on their arrival and upon their outbound flight as well. Although the line was never quite completed, it remained a fundamental principle of defence for the remainder of the war. As of 14 July home defence squadrons were detached from the training organization and reconstituted as an operational wing under the command of Lieutenant-Colonel F.V. Holt, with headquarters in Adastral House, London. By the end of the year eleven squadrons had been formed, each with two or three flights dispersed to cover the squadron's patrol responsibilities along the barrage line, and guns, lights, and aeroplanes were tied in with the communications network the RFC had slowly built up since February. England and Scotland were divided into warning control areas, each subdivided into warning districts thirty to thirty-five miles square. Since a zeppelin took about thirty minutes to cross a district, it became possible to institute a graduated series of alerts, instead of the blanket warnings issued previously, which had considerably disrupted munitions production.<sup>19</sup>

Important as these innovations were, the most significant development was the adoption by the RFC in June and July of new types of ammunition designed

\* J.S. Beatty of Toronto, J.B. Brophy of Ottawa (WIA 8 Aug. 1916), C.J. Creery of Vancouver (KIA 20 Oct. 1916), the brothers E.J. and L.P. Watkins of Toronto (the latter KIA 1 July 1918), and F.H. Whiteman of Kitchener, Ont.

specifically for use against airships and balloons and forbidden for use against any other targets. The Buckingham bullet was a combination of tracer and incendiary; the Brock and Pomeroy types combined explosive and incendiary qualities. The three were usually mixed with standard ammunition and fired by means of a Bowden cable from a Lewis gun mounted on the top plane. The useless armament of bombs and darts could now be discarded; airships could be attacked from below. A technological turning-point had been reached in the struggle against the night raiders.<sup>20</sup>

Meanwhile the German Naval Airship Division and its army counterpart were preparing for a resumption of the offensive in a spirit of confidence. Strasser, ever optimistic, wrote to *Admiral Scheer* on 10 August:

The performance of the big airships has reinforced my conviction that England can be overcome by means of airships, inasmuch as the country will be deprived of the means of existence through increasingly extensive destruction of cities, factory complexes, dock-yards, harbour works with war and merchant ships lying therein, railroads, etc. ...

I am well aware of the generally prevailing personnel problems, but believe that the personnel must be made available, if necessary through reduction in other areas, since the airships offer a certain means of victoriously ending the war.<sup>21</sup>

Strasser's new airships were those of the L 30 type, received at Nordholz in May. These giants had a gas volume of nearly 2,000,000 cubic feet; their six engines drove them at 62 mph. With a useful lift of over 60,000 pounds, they could carry five tons of bombs. Yet the new type did not add greatly to the problems of the defence, since the L 30 was little faster than earlier types and its operational ceiling was about the same.<sup>22</sup>

In a series of raids in late July and early August the airships probed the region between the Thames and The Wash and then on 8–9 August shifted their attention to northern England. Once more, there was strong public criticism of the flying services.\* It redoubled when Heinrich Mathy, commanding L 31, penetrated the London defences on 24–25 August, causing substantial damage. Now Strasser determined to make a major effort. On 2–3 September he launched the largest airship raid of the war. Sixteen raiders took part, including four from the army. The target was London, but the only airship to reach the city was SL 11 commanded by *Hauptmann* Schramm. Subsequently his course intersected with that of a BE2c flown by a young British pilot, Second Lieutenant William Leefe Robinson, who had been guided by searchlights which had picked up the airship. Attacking

\* Major J.L. Baird, MP, the Air Board's spokesman in the House of Commons, told RNAS representatives at a meeting of the board that 'justifiable ground for complaint' existed. Subsequent staff conferences within the Admiralty showed, among other things, that the RNAS had rejected the new ammunition, still regarded night flying in 'high performance' aircraft as dangerous for pilots, and was not properly tied in to the home defence intelligence network. Though Admiralty representatives disputed the claim of station commanders that War Office intelligence of zeppelin movements was not being passed to them 'sufficiently rapidly' by the Admiralty, the raid record would seem to bear the latter out. LZ 97, for example, bombed the environs of Felixstowe on 23 August before any response could be made from the air station. Minutes of 21st meeting of Air Board, 14 Aug. 1916, Air 6/2; minutes of Admiralty meetings, 11 and 18 Aug. 1916, Air 1/667/7/122/739

from below, Robinson fired three drums of 'alternate New Brock and Pomeroy' before he saw a glow. The enormous flame of the stricken airship 'lit up bright as day the L 16,' which was nearly ten miles to the north. Robinson, the first airman to demonstrate the vulnerability of airships to air attack, was awarded a Victoria Cross for his efforts. That the destruction of SL 11 was not a fluke was proved on 23-24 September, when L 33 was shot down by gunfire and L 32, already damaged by the London guns, was brought down by a pilot from 39 Squadron 'with a mixture of Brock, Pomeroy and Tracer ammunition.'<sup>23</sup>

The tide had turned. Strasser henceforth permitted only the newer airships to attack the London area, and army airships never attempted to raid England again. Morale dropped among the crews of the Naval Airship Division, one officer recording that 'If anyone should say that he is not haunted by visions of burning airships, then he would be a braggart.'<sup>24</sup> Nevertheless, another raid was ordered for 1 October. While five naval airships meandered aimlessly over the eastern Midlands, the able Heinrich Mathy in L 31 struck straight for London. As he came into the searchlight zone he veered to the northwest and, hoping to elude the gun defences, cut his engines and drifted with the wind to the south and east. At about 1130 hrs he opened up his engines, was picked up by the lights, and immediately came under fire from the guns.

At this point L 31 was sighted by a pilot from Canada, Second Lieutenant W.J. Tempest.\* Tempest later reported:

About 11:45 p.m. I found myself over S.W. London at an altitude of 14,500 feet. There was a heavy ground fog on and it was bitterly cold, otherwise the night was beautiful and star lit at the altitude at which I was flying.

I was gazing over towards the N.E. of London, where the fog was not quite so heavy, when I noticed all the searchlights in that quarter concentrated in an enormous 'pyramid.' Following them up to the apex I saw a small cigar shaped object, which I at once recognized as a Zeppelin about 15 miles away ...

At first I drew near to my objective very rapidly (as I was on one side of London and it was on the other and both heading for the centre of the town) all the time I was having an extremely unpleasant time, as to get to the Zepp I had to pass through a very inferno of bursting shells for the A.A. guns below.<sup>25</sup>

To make matters worse, Tempest's fuel pressure pump failed and he had to resort to the exhausting exercise of maintaining pressure with a hand pump. As he approached L 31, at a slightly higher altitude than the airship, he discovered that she was gaining height at a rate that his BE2c could not match:

I therefore decided to dive at her, for though I held a slight advantage in speed, she was climbing like a rocket and leaving me standing. I accordingly gave a tremendous pump at

\* Tempest, though Yorkshire-born, had been homesteading and horse-breeding along with his brother Edmund (also a notable RFC pilot, see chapter 12) near Perdue, Sask., for some years before 1914. After being wounded with the army in France, he had transferred to the RFC and joined 39 Squadron in July 1916. Though he was later to serve in the RAF during the Second World War, attaining the rank of wing commander, he established permanent residence in Canada after 1918.

my petrol tank, and dived straight at her, firing a burst straight into her as I came. I let her have another burst as I passed under her and then banking my machine over, sat under her tail, and flying along underneath her, pumped lead into her for all I was worth. I could see tracer bullets flying from her in all directions, but I was too close under her for her to concentrate on me.

As I was firing, I noticed her begin to go red inside like an enormous Chinese lantern and then a flame shot out of the front part of her and I realized she was on fire.

She then shot up about 200 feet, paused, and came roaring down straight on to me before I had time to get out of the way. I nose dived for all I was worth, with the Zepp tearing after me, and expected every minute to be engulfed in the flames. I put my machine into a spin and just managed to corkscrew out of the way as she shot past me, roaring like a furnace.

I righted my machine and watched her hit the ground with a shower of sparks. I then proceeded to fire off dozens of green Very's lights in the exuberance of my feelings.

I glanced at my watch and saw it was about ten minutes past twelve.

I then commenced to feel very sick and giddy and exhausted, and had considerable difficulty in finding my way to ground through the fog and landing, in doing which I crashed and cut my head on my machine gun.<sup>26</sup>

Tempest received a Distinguished Service Order for his night's work.

The last raid of 1916 saw nine naval airships attack the east coast of England at various points from Norfolk to Durham, with some penetrating well into the Midlands. All refrained from attacking southern England, but this new caution was to no avail. For the first time the RFC organization outside the London defence region proved effective in meeting enemy raids. The log of 36 (HD) Squadron shows that word of the impending raid reached squadron headquarters at Newcastle at 1945 hrs, almost four hours before L 34 and L 35 crossed the coast between the Tyne and the Tees. With such forewarning a pilot from the Seaton Carew flight of the squadron was able to shoot down L 34. L 21 was finally overtaken on her outward passage and shot down by RNAS aircraft from Great Yarmouth. It seems likely that one of the RFC pilots who first gave chase to L 21 was Lieutenant J.B. Brophy of 33 Squadron, the only Canadian then with the unit. Flying from Kirton-in-Lindsey in a BE12, Brophy was aloft for three hours. About 1000 hrs he spotted the zeppelin well ahead, between 8000 and 9000 feet above him, and pursued it against a headwind for fifty minutes before abandoning the chase 'as it was obvious that I could not catch her up.'<sup>27</sup>

Despite the disasters of late 1916, Peter Strasser believed that improved zeppelin performance could still overcome the British defences. His solution was to sacrifice speed to gain height and thus to place the airships beyond reach of both guns and aircraft. Fuel supply, defensive armament, and quarters for the crew were all cut back drastically, the number of engines was reduced by one, and structural members were lightened. The result was a new zeppelin type, 'the

\* Don Brophy, from Ottawa (WIA 8 Aug. 1916) was an outstanding all-round athlete who had played football for his city in the Big Four, the predecessor of the eastern conference of the Canadian Football League. He was killed in a flying accident at Kirton-in-Lindsey in December 1916 when his BE12 failed to recover from a loop. He left one of the most detailed personal diaries of any Canadian flyer during the war, now held at DHist.

height climber,<sup>7</sup> that could operate at ceilings from 16,000 to 20,000 feet. The new heights meant new problems. Intense cold and lack of oxygen affected the performance of both engines and crew. An oxygen supply system became necessary for flight personnel. Navigation was more difficult since weather at the new heights was unpredictable. Since the airships now flew above all normal cloud levels except cirrus, they became more dependent than before upon wireless bearings. All these factors help explain the generally ineffective record of zeppelins for the rest of the war. During the whole of 1917 there were only seven raids by airships on England, as compared with twenty-two in 1916 and twenty in 1915, and the great heights from which bombing was carried out further reduced the Naval Air Division's significance as an offensive weapon.<sup>28</sup>

Of the seven zeppelins lost over England in 1917, only one was shot down by home defence forces, and that by a Canadian, Lieutenant Loudon Pierce Watkins of Toronto. Watkins, who with his brother Edward had been commissioned in the RFC in late 1915 after learning to fly at the Toronto Curtiss School, had joined 37 Squadron in December 1916 after a few months of service on the Western Front.\* He had gained some limited experience of the nature of anti-zeppelin operations during the raid of 16-17 March, and probably during that of 23-24 May as well, but like other airmen was unable to come to grips with the height climbers. Then, on the night of 16 June, Strasser sent four of the new airships to attack London. Only two, L 42 (*Kapitänleutnant* Martin Dietrich) and L 48 (*Korvettenkapitän* Viktor Schütze, Strasser's deputy), were able to reach England.

Why this raid was launched, at a time of year when the airships would have only a few hours of midsummer darkness over England, is inexplicable. Though attracting the attention of the defences, Dietrich managed to bomb Ramsgate from a great height and get safely back to his base, having been nineteen hours in the air and for eleven hours at heights over 16,500 feet. From about 18,000 feet L 48 attempted to bomb the naval base at Harwich, but her bombs fell in fields some miles away. Schütze, however, was now having navigational difficulties. His liquid compass had frozen, and to free it he seems to have decided to descend into warmer air. Meanwhile, Watkins had taken off from Goldhanger airfield with instructions to seek a zeppelin near Harwich.

When at 11,000 feet over Harwich I saw the A.A. guns firing and several searchlights pointing towards the same spot. A minute later I observed the Zeppelin about 2,000 feet above me. After climbing about 500 feet I fired one drum into its tail but it took no effect. I then climbed to 12,000 feet and fired another drum into its tail without any effect. I then decided to wait until I was at close range before firing another drum. I then climbed steadily until I reached 13,200 and was then about 500 feet under the Zeppelin. I fired three short bursts of about 7 rounds and then the remainder of the drum; the Zepp burst into flames at the tail, the fire running along both sides, the whole Zepp caught fire and fell burning.<sup>29</sup>

\* Other Canadians who flew with 37 Squadron during 1917 included W.A. Bishop of Owen Sound, Ont., W.R.S. Humphreys and C.J.L. Lawrence of Parry Sound, Ont., D.R. Smith of Sherbrooke, Que., and A.R. Stevenson of Peterborough, Ont. (WIA 5 June 1917).

Captain Robert Saundby, who had ascended from the experimental station at Orfordness in a DH2, also fired at L 48, but Watkins had delivered the decisive blow, and was rewarded with a Military Cross.

One other 1917 raid is worthy of note: the 'silent raid' of 19–20 October. The great heights at which the eleven raiding airships operated rendered the defence forces all but powerless, but at the same time proved disastrous to the attackers. As the zeppelins rose to altitudes of 16,000 feet or more on approaching the English coast, the light winds they had encountered were replaced by gale-force winds from the northeast, which heralded the onset of a deep depression. The peculiar atmospheric conditions deadened the sound of their engines and thus baffled the home defence organization, but hostile guns and aircraft were the least of the airship commanders' worries. Freezing cold, engine breakdown, height sickness, and, above all, navigational confusion caused by failure to recognize soon enough the change in wind conditions combined to bring disaster. Five zeppelins were lost: one crashed in southern Germany after having drifted over the trench lines of the Western Front, another was shot down over the front, and L 50 was lost somewhere over the Mediterranean. A fourth came down, virtually intact, in France. L 45, according to a member of its crew, made a European tour from Denmark to the Riviera, via London and Paris, in twenty hours. The zeppelin was blown south from the Midlands over London, and dropped bombs as it crossed the city. London was the commander's first positive navigational fix in some hours and he promptly turned eastward, on a homeward course bucking the strong winds. L 45 would probably have made it home had she not been pursued by a BE2c flown by Second Lieutenant T.B. Pritchard of 39 Squadron. Pritchard, some 3000 feet below where the winds were lighter, followed the airship out to sea and fired on it. L 45 immediately altered course to the south, gained height and outran her attacker, but in so doing was irrevocably committed to a track that brought her down in France. Pritchard, meanwhile, succeeded in making the English coast and crashed while attempting to make a forced landing in the blackness. He was one of six defence pilots to do so that night.\*<sup>30</sup>

By the time Watkins had shot down L 48, the British Cabinet, the public, and the RFC's higher command had shifted their attention to a new menace: daylight raids by German aeroplanes. As long ago as the autumn of 1914 Germany had organized a squadron (its cover name was 'the carrier pigeon squadron') at Ghisteltes, near Ostend, under the command of *Major* Wilhelm Siegert, with the objective of bombing England. Because of the short range of existing aircraft it was vital to this plan that Calais be seized; the failure of the Germans to do so resulted in the dropping of the plan and the transfer of the squadron to Metz. Nevertheless, development work continued on longer-range aircraft, and by the end of 1915 Germany had a few machines of the G series (*Grosskampfflugzeug*) in action on the Western Front. When *General* Erich von Hoepfner became commander of the reorganized German air force in 1916 he proposed to the High Command that

\* Pritchard, address unknown, transferred from the Canadian Expeditionary Force to the RFC in April 1917. Awarded the MC for this attack, he died in hospital of pneumonia on 5 December 1917.

because of the failure of the zeppelin campaign and the potential of G-type aircraft, attacks on England must be launched 'as soon as practicable.'<sup>31</sup>

It was the G-IV, the 'Gotha,' that made such raids possible. A large, ungainly biplane, it was powered by two 260-hp Mercedes pusher engines and could carry a bomb load of 300 to 500 kg. With a maximum speed of 87.5 mph, a ceiling of 21,000 feet (though usually it operated at 15,000 feet or slightly higher), and an endurance of about four hours (longer with auxiliary tanks), the Gotha was a formidable aircraft. Her crew of three had two or three machine-guns as defensive armament, including the famous 'sting in the tail' which could be fired through a tunnel in the belly, eliminating the blind spot to the rear.<sup>32</sup>

To carry out Hoepfner's plan for raiding England (code named *Türkenkreuz*), elements of Siegert's original squadron were formed into *Kampfgeschwader 1 (Kagohl 1)*, universally known as the *Englandgeschwader*. After a period of flying training over the North Sea, the unit was moved to Belgium, two *Staffeln* being based at each of three airfields, St Denis Westrem, Gontrode, and Mariakerke.\* The objectives of the *Englandgeschwader*, as laid down by the German High Command, were to disrupt British industry, communications, and transport, and to strike at the morale of the British people. According to *General* von Hoepfner, the bombing offensive was also designed 'to split up the numerically superior forces of the Allies in the air.'<sup>33</sup>

The possibility of German aeroplane raids against southeastern England had not been entirely overlooked by the home defence organization. Hit-and-run raids, usually by single aircraft, had become a regular occurrence along the Channel coast. At a meeting of the Air Board in December 1916 the means of combating an aeroplane raid in strength had been discussed, although the possibility of adequate resistance without unduly weakening the front line seemed unlikely. But the defeat of the zeppelins, the need for more guns to protect shipping against U-boats, and the rising demand from the Western Front for more pilots and aircraft led to reductions in both gun and air defences in early 1917. In March thirty-six pilots were sent from home defence squadrons to the Western Front; as Sir David Henderson said, 'the diminished risk from Zeppelins amply justifies this temporary reduction.' It was also decided that gun defences outside the coastal areas need not be manned by day, and the experienced gunners thus relieved were transferred for duty elsewhere. At the same time, the home defence staff continued to plan against the possibility of German daylight raiding and attempted to concert a new system of patrols with the RNAS. Although the Admiralty agreed to co-operate, it proposed to withdraw its fighting aircraft from Grain and Detling, two coastal stations, as soon as the RFC was in a position to accept its full responsibilities for home defence. Field Marshal Lord French, Commander-in-Chief of the Home Forces, expressed deep concern on 20 March that the Home Defence Wing had been reduced 'to a dangerously low point,' but the opinion of the War Office was that the home defence shortage was not disproportionate to that existing in RFC establishments overseas.<sup>34</sup>

\* Each *Staffel* consisted of six Gothas and their crews. The squadron's designation became *Kagohl 3* early in 1917.

Late in the afternoon of 25 May German aircraft appeared high over the south coast of England. Heat haze, cloud, and the silvery-white colouring of the aircraft prevented any accurate estimate of their numbers (there were in fact twenty-one); some observers thought there were zeppelins with them. Encountering high cloud over the Thames estuary, the Gothas abandoned London as a target and swung about to bomb Shorncliffe (where thirteen Canadian soldiers were killed and seventy-six more wounded) and Folkestone. Only the coastal guns fired while, according to the intelligence summary issued by GHQ Home Forces, the pilots reported 'unanimously on the impossibility of their rising to the same height as the enemy, attaining the same speed, or engaging him with sufficient reserve of power with the engines at their disposal ... They could not do anything.' Two Canadian lieutenants with 37 Squadron had typical experiences. L.P. Watkins sighted the Gothas, but his BE12 was too slow 'so could not engage'; W.R.S. Humphreys, a prewar English immigrant to Canada who had joined the CEF at Valcartier in 1914, 'chased hostile aircraft 20 miles out to sea. Owing to their superior speed could not engage.'<sup>35</sup> Although fighters from RNAS Dunkirk shot down one of the raiders off Ostend, the first German test of the daylight defence of England had proved most successful.

This was confirmed by a second raid on 5 June when, with almost no advance warning for the defences, twenty-two Gothas swept in over the Essex coast, bombed Shoeburyness and the naval installations at Sheerness in Kent (including four bombs on 'the Rear Admiral's tennis ground'), and were homeward bound before much defensive reaction occurred. One raider was shot down in the sea by a coastal battery, but none of the sixty-six aircraft which attempted to thwart the raiders was able to come to grips with them. RFC aircraft were unable to get above 15,000 feet; their pilots estimated that the enemy formation was at least 2000 feet higher.<sup>36</sup>

The confused and angry public reaction to the Gotha raids was dealt with by the editor of *The Aeroplane* in his usual trenchant fashion:

Of course, we shall have the usual outcry about the Hunnishness of bombing women and children, but we should clear our minds of cant in this matter. Women and children should not remain in the war zone. If the enemy is so efficient as to increase the depth of the war zone, either by long-range guns or by improved aeroplanes, and if he is allowed to operate those improved weapons, that is his good fortune and our misfortune. Our authorities are to blame for casualties, not the enemy. We must either stop the raids or evacuate the civilian population from the raidable area.

We can draw a map of England showing the area over which raiders can operate, within the known limits of their petrol supply, or we can draw a map of Flanders showing the area within which concentrations of enemy raiding machines are not to be permitted. The choice lies entirely with us ...<sup>37</sup>

The War Cabinet chose not to reply to what a minister termed German 'frightfulness' because bombing aircraft could not be spared from the Western Front. Instead, English air defences were patched up. On 25 May there had been only twenty-two home defence aircraft in that part of southeastern England (including

London) within the Gothas' calculated radius of 125 miles. Pilots were also in short supply. Since February seventy-seven experienced pilots had been posted out of home defence squadrons which had just over half their total establishment of 198 pilots. A War Office conference on 31 May adopted a makeshift solution. Home defence duties were assigned to the experimental stations at Orfordness and Martlesham Heath, to staff pilots at aircraft acceptance parks, and to instructors in a number of training squadrons which were shifted to the southeast for the purpose. The conclusion of the conference that 'under the arrangements proposed there was no likelihood that the enemy aeroplanes would be able to avoid an engagement with our own fighting machines' seemed unwarranted to Lord French. As Commander-in-Chief Home Forces he bore the ultimate responsibility for home defence, and he concluded that 'the means placed at my disposal are now inadequate and ... a continuance of the present policy may have disastrous results.'<sup>38</sup>

On 13 June *Hauptmann* Ernst Brandenburg, the commander of *Kagohl 3*, was advised by the army's meteorological service that conditions were right for a strike at London itself. His aircraft were able to fly above the clouds until the Thames estuary was reached; from Southend to London no cloud cover existed, but though anti-aircraft guns opened fire, the defences had been caught napping. According to Brandenburg's report, only one defence aircraft attacked his formation 'with vigour.' He claimed to have bombed a railway station (it was in fact Liverpool Street Station), Tower Bridge, and docks and warehouses in the City. Casualties from the raid were the worst of the war; 161 people were killed and 429 injured.<sup>39</sup>

Numerically, at least, the air defences had responded well: there were fifty-three aircraft aloft against the Gothas and, within eight minutes of the first warning, thirty had been in the air, most of them from home defence squadrons. But very few of these aircraft could be described as first-line fighters. No 37 Squadron, for instance, put twelve aircraft up from its three airfields. Its night pilots, including L.P. Watkins, were flying the inadequate BE12; others were in Sopwith 1½ Strutters (the two-seater variety), or BE2ds and 2es. One pilot flew an RE7. With aircraft of every type coming from a wide variety of squadrons and other formations, lacking common direction and having had no firm instructions on tactics to be employed, it was natural that for the few pilots who actually saw the enemy the fight was one of individual tactics. Not a single German aircraft was lost. The Air Board later noted that neither guns nor aeroplanes had been able to break up the Gotha formation. It was also clear that the expedient of 31 May had failed. The training squadrons and aircraft acceptance parks had reacted slowly to the raid alert. No concentration of effort had been achieved.<sup>40</sup>

For the War Cabinet and the public alike, what was wanted was a bomber-proof defence system. In General Trenchard's memorandum of 15 June 1917, 'Methods suggested for the preventing of air raids in the United Kingdom,' there was little comfort. Some public men had suggested round-the-clock patrols. Trenchard dismissed the ideas as totally beyond the capabilities of the RFC. The only real solutions were either to capture Brandenburg's airfields during the Flanders offensive, or to destroy them through sabotage. Trenchard did not reject the popular remedy,

reprisal, but 'to outlast the enemy' (a necessary corollary to it) a bomber force would first have to be built up. For the time being the War Cabinet was obliged to accept that it was neither technically possible to construct an invulnerable defence system, nor militarily feasible to mount a bombing offensive. In the War Cabinet discussions, however, the effect of Brandenburg's London raid had been to associate directly the need for a defence against the bomber with the idea of attacking Germany.<sup>41</sup>

Two raids at the beginning of July showed that, even with somewhat strengthened defences, the problem of the bombers was far from being solved. On 4 July sixteen Gothas attacked Felixstowe air station and Harwich. They were not seen until 0555 hrs, just five minutes before they commenced bombing; by 0720 hrs the formation, still intact, was on its way back to its Belgian bases. Although neither casualties nor damage was heavy (a Large America seaplane was destroyed on the slipways at Felixstowe), the suddenness of the raid revealed serious deficiencies in the British intelligence and communications system. In all, 103 aircraft of many types were airborne, but the order to patrol was not given until the Germans had already turned for home. Of the three home defence squadrons taking part, 37 Squadron got its orders at 0729 hrs on two of its airfields, and at 0735 hrs on the third, while 50 Squadron was ordered up at 0727 hrs and 39 Squadron a minute later. As a result of a War Cabinet decision of 20 June, two fighter squadrons, 56 and 66, had been transferred temporarily to the home defence organization on 21 June. No 56 Squadron, stationed at Bekesbourne near Canterbury, had its SE5s into the air within four minutes of receiving patrol orders at 0727 hrs, but sighted no Gothas.\* No 66 Squadron, based at Calais, found the returning bombers and then lost them in cloud. Nevertheless, a furious fight developed when a flight of Sopwiths of 4 Squadron sent up from Dunkirk intercepted the enemy formation. 'Two machines were brought down in flames and a third machine was seen to have only one engine running ... Several other machines were attacked with indecisive results.'<sup>42</sup>

On 7 July, a hazy but fine Saturday morning, occurred the most spectacular aeroplane raid of the war, a raid that shook the British government, set off anti-alien riots in several parts of London, and brought profound changes in air policy. All this was accomplished by a mere twenty-two Gothas, twenty-one of which reached London. First reported off the Kentish coast at 0914 hrs, the German formation, described by observers as diamond-shaped, began its attack on London at 1020 hrs. The last bomb fell twenty minutes later. The raid was witnessed by millions of people, and the impotence of the home defence forces was never more graphically exposed. The warning time given the defenders had been adequate: all air units were given patrol orders between 0924 hrs and 0933 hrs, and ninety-five aircraft, all but sixteen of them from the RFC, rose to meet the bombers. Four of the home defence squadrons contributed forty-six aircraft, the balance coming from experimental and training establishments. Yet the defenders seemed virtually powerless. Captain J.B. McCudden, an outstanding British fighter pilot, was

\* V.P. Cronyn of London, Ont., and R.T.C. Hoidge and R.G. Jardine of Toronto (the latter KIA 20 July 1917) took part in this fruitless exercise.

stationed at this time at Joyce Green as an instructor with 63 (Training) Squadron. He repeatedly attacked the German formation at a height of 17,000 feet, and after using all his ammunition, flew in close to it, 'endeavouring to draw Hostile Fire to enable several Sopwith Scouts and Camels, which were following Hostile Formation, to close and get in a good burst while Hostile Gunners were engaging me. Either our machines did not appreciate my intention, or did not want to, I do not know, but they had a splendid opportunity if they had availed themselves of it.'<sup>43</sup>

The reports of two Canadians involved did not show any reluctance to engage the enemy and their reports were typical of those submitted, at least from home defence pilots. L.P. Watkins chased the enemy five miles out to sea, finally overtaking the formation in his slow BE12, fired one drum of ammunition, and then had to return with engine trouble. Lieutenant G.A. Thompson of Vaudreuil Station, Que., from 37 Squadron, had engine trouble with his Sopwith Scout almost from the moment of take-off. He nevertheless clawed his way up over London to engage Gothas from below, only to become an easy target for the German tunnel-gunners. Thompson breezily reported that his aircraft had been sprayed with bullets, 'one in the seat, others just round about.' Two British pilots were killed while attacking the bombers; one Gotha, lagging behind the main body, was shot down in the sea by an Armstrong-Whitworth from 50 Squadron.\* It was not resolution that was wanting, but co-ordinated fighter tactics and more first-line aircraft. Only fifteen of the aircraft sent up from home defence squadrons were of the latest type. Other units contributed, in ones and twos, twenty-one additional aircraft, few of them first-class machines. Yet when accounting for the lack of success in its defensive effort the RFC home defence staff gave prominence to 'the apparent invulnerability' of the Gotha.<sup>44</sup>

In an atmosphere of tension the War Cabinet met a few hours after the raid had ended. The Chief of the Imperial General Staff, General Sir William Robertson, wrote to Sir Douglas Haig that 'One would have thought that the world was coming to an end. I could not get in a word edgewise.'<sup>†</sup> Although the War Cabinet was once again forced to accept the opinion of its military advisers that the resources to attack German cities were not available, in its next meeting it proceeded to set up a sub-committee to examine the home defence system and 'the air organization

\* RNAS pilots from Manston also claimed to have shot down three bombers, but *Kagohl 3*'s additional losses were incurred in crashes of four aircraft on landing after the raid.

† There was considerable agitation when it was discovered that 56 and 66 Squadrons had been returned to France two days before the raid, despite a protest from Lord French. His memorandum, written on 2 July but side-tracked by administrative muddling before it reached the Cabinet, declared that without these fighter squadrons his forces would be inadequate to defend London. Robertson had some sympathy for French's position. 'There is no doubt that French has not got a very good force. It is mainly made up of oddments, and of course oddments will not do.' The War Cabinet, while unravelling this tangle, decided to have two more fighter squadrons sent over to England. When Haig protested on 7 July that the 'fight for air supremacy preparatory to forthcoming operations was definitely commenced by us this morning,' and that the loss of two squadrons would 'certainly delay favourable decision in the air,' the War Cabinet reduced its demand to one. See Sir William Robertson, *Soldiers and Statesmen, 1914-1918* (London 1926), II, 17; Chief to Chief, London, 7 July 1917, Air 1/522/16/12/5; minutes of 178th, 179th, 180th War Cabinet meetings, 7, 9, 10 July 1917, Cab 23/3.

generally and the direction of aerial operations.' General Jan Christian Smuts of South Africa was, in effect, the sub-committee. His chief recommendation was that the 'nerve centre' of the British Empire demanded 'exceptional measures' for its defence and that therefore the whole of the London air defence organization should be placed in the hands of 'a senior officer of first-rate ability and practical air experience.' He also recommended that gun defences be strengthened, that three more squadrons be added to home defence, that formation tactics be adopted, and that an air reserve be constituted to counter the possibility of a diversionary attack followed by a major assault.<sup>45</sup>

Brigadier-General E.B. Ashmore was the officer selected to take over the responsibility for the defence of the capital, exchanging, as he later wrote, 'the comparative safety of the Front for the probability of being hanged in the streets of London.' Not only was he given command of the London Anti-Aircraft Defence Area but also of Zone 'X,' which included the whole area of southeastern England considered vulnerable to aeroplane attack. Ashmore's appointment took effect on 8 August. By the end of the month he had received more guns and three new squadrons to add to the existing six, not to speak of naval fighters at Manston and Walmer and the usual mixed collection of aircraft from training squadrons, depots, and experimental stations. The nine home defence squadrons became the Home Defence Group, under Colonel T.C.R. Higgins. Large white arrows, visible (in clear weather) from 17,000 feet, were placed about southeastern England to direct aircraft towards hostile formations.<sup>46</sup>

Scarcely had Ashmore taken over his new command when the Gothas returned. This time they did not have things all their own way. The German formation was sighted by a patrol of five aircraft from 3 (Naval) Squadron at Dunkirk, out on a fleet protection sweep. The patrol, which included Captain G.S. Harrower of Montreal and Lieutenant R.F.P. Abbott of Carleton Place, Ont., pursued the Gothas at 15,000 feet almost to Harwich. Harrower put all his ammunition into the hindmost machine without result, and then the naval pilots had to land at English airfields to refuel. As the Gothas approached the English coast, one of their number veered away from the formation, dropped its bomb-load on Margate, and turned back across the sea. It was pursued by a patrol of Sopwith Pups from the RNAS Home Defence Flight at Walmer, including Flight Lieutenant H.S. Kerby of Calgary and Flight Sub-Lieutenant M.R. Kingsford of Toronto. Kingsford had to turn back, but the others pursued the raider almost to Zeebrugge before losing it. The Gotha in fact crash-landed on the beach.

Meanwhile, the German formation had continued towards its objective, the naval base at Chatham. Wrongly deciding that the enemy's target was London, Ashmore held back his defence aircraft, either keeping them in reserve on the ground or ordering them to fly patrols inland, guarding the capital.\* Contrary winds and the ascent of fighters from 61 Squadron at Rockford, over whose airfield the Gothas had passed, prompted the German commander to bomb his secondary

\* Their number included eighteen Sopwith Pups from 46 Squadron, based at Sutton's Farm. This was the squadron the Cabinet had requested from France after the 7 July raid; its pilots included R.L.M. Ferrie of Hamilton (KIA 31 Jan. 1918) and L.M. Shadwell of Belmont, Man.

target of Southend and turn for home. Kerby, returning from his North Sea flight, flew towards anti-aircraft bursts he saw over Southend and met the Gothas in an engagement that won him a DSC.

The hostile aircraft [he recalled] were about 2,000 ft above me when I got under them. I followed climbing to 18,000 ft and attacked without result. I then observed one Gotha 4,000 ft below the formation, but with it. I attacked from the front and drove him down to water, where I observed him to turn over.

One of the occupants I saw hanging on the tail of Gotha, I threw him my lifebelt and did two or three circuits round him and then returned to England.

On my way back I observed four destroyers when at 6,000 ft going towards Dunkirk. I fired three Red Very's Lights to try and get them to follow me back to the machine in the water, but they continued on their course.<sup>47</sup>

Despite this rough handling (in addition to Kerby's victim, five had crash-landed), the temporary commander of *Kagohl 3* launched another attack on 22 August upon Southend, Chatham, and Dover. As the German formation approached the English coast it became apparent to the crews that a hornet's nest awaited them. Anti-aircraft fire was more intense than they had encountered before. Fighter aircraft from the RNAS stations at Manston, Eastchurch, Walmer, and Dover were already at their height. A confused mêlée ensued and three Gothas were shot down. A number of Canadians were prominent in this action, including Kingsford and Kerby from Walmer and Flight Commander G.E. Hervey of Calgary from Dover. Hervey and Kerby got to close quarters with the bombers and both claimed to have shot one down in the sea. It is possible that both engaged the same aircraft. In any case, two Gothas were credited to the anti-aircraft gunners and a third to a naval pilot from Manston.\* Although only a few RFC aircraft were in contact with the enemy, a total of 120 went up on patrol, the largest number of home defence machines to take to the air during the war.<sup>48</sup>

After this raid the Germans decided that daylight operations were no longer feasible because of 'better organized air defence.'<sup>49</sup> For the German crews the chief difficulty in the decision to switch to night attacks was navigational, but for the defence the German resort to night operations meant that the elaborate system built up to counter day raids had to be discarded. When, on 3 September, the first night raid occurred, only sixteen RFC aircraft went up. None of the pilots saw the

\* Hervey was awarded a DSC for his part in this encounter.

† Just a day before this raid there had been an informal meeting of pilots from both RFC and RNAS units in the London Anti-Aircraft Defence Area. The subject of discussion was the apparent invulnerability of the Gotha to .303 machine-gun fire; doubtless information was exchanged about tactics as well. Among other things the pilots discussed the possibility of using a heavier calibre than the .303 or of using Brock and Pomeroy ammunition against Gothas. Although the use of this ammunition had been permitted against zeppelins, it was against regulations to employ it against aeroplanes. The outcome of the meeting was a request from the Admiralty to the Air Board for permission to use such explosive bullets against the raiders. The matter finally went to the War Cabinet, approval being given on 28 September 1917. Minutes of meeting, 21 Aug. 1917, Vyvyan memorandum, 28 Sept. 1918, Air 2/02156/1917

enemy. The warning system broke down as well; a drill hall at Chatham full of sleeping naval ratings was bombed, 130 men being killed and eighty-eight injured.

The methods used against night-flying zeppelins were of little avail against Gothas. Scant warning was possible and the bombers were much more elusive targets than the airships. Although the chance of night raids had preoccupied the defence staff (indeed, on 3 September a rehearsal for such an eventuality was in progress), no one believed that serious opposition could be given, especially in view of recent night-bombing experience on the Western Front. Both flying services were convinced that first-line, single-seater fighters like the Camel and the SE5 were too unstable to fly at night. Out of the 191 BE2s, BE12s, RE7s, FE2s, and Armstrong Whitworths available to the defence, only twelve FE2ds fitted with 250-hp Rolls-Royce engines were capable of coping with the Gothas. On 3 September the RFC staff estimated that there were fewer than three 'efficient' aircraft in each flight of the home defence squadrons. The one bright spot for the defence was 44 Squadron's use of three Camels during the raid. The proof that this first-class fighter could function at night without undue difficulty paved the way for a significant strengthening of the defence forces.<sup>50</sup>

Meanwhile, the Germans struck at London on 4 September, and were virtually unopposed. The War Cabinet, advised that 'no local means of keeping off such attacks had yet been discovered,' turned again to General Smuts for advice on home defence and also for suggestions on 'carrying the air war into Germany at the earliest possible moment.' Smuts judged that home defence aircraft, unable to locate the enemy even at a range of a few hundred yards, 'might just as well have remained on the ground.' More powerful searchlights and the balloon barrage that General Ashmore was experimenting with were only palliative methods. He concluded that 'we can only defend this island effectively against air attacks by offensive measures, by attacking the enemy in his air bases on the Continent and in that way destroying his power of attacking us over the Channel.'<sup>51</sup>

General Ashmore was certainly not prepared to concede that the defence was powerless. Banking on acquiring more Camels and other first-class fighters, he cleared the guns from the area between London's outer defences and the city itself, filled this zone with searchlights, and used the surplus guns to extend the barrier about the city, which eventually encircled it at a distance of some ten miles from the populated area. The balloon barrage was designed to prevent hostile aircraft from flying below a certain height, thus limiting the zone to be searched by defending aircraft to that between the balloon 'apron' and the operational ceiling of the Gothas. As well, a number of top fighter pilots were posted into the home defence squadrons. For example, Captain A.E. Godfrey from Vancouver, an accomplished pilot serving with 40 Squadron in France, was transferred to 44 Squadron towards the end of September. Godfrey, whose operational experience was largely on Nieuports, had never flown a Camel, and found it 'so much more active - it would do everything faster and climb just like a rocket.' He and others like him were put through intensive training in night landing and night navigation over their patrol areas and in the handling of guns and the clearing of gun stoppages in the dark. Though cockpit illumination of instruments was soon provided, for the most part the pilot was very much on his own. There were other hazards

during an actual raid. 'We were depending on picking up the Hun from the flame of his exhaust,' Godfrey recalled, 'and the anti-aircraft [bursts] were supposed to be around them. But we found that mostly the anti-aircraft were around patrolling aircraft.'<sup>52</sup>

Before there was any real opportunity to train pilots in the new system, and before adequate numbers of good fighter aircraft could be obtained, the Germans launched a series of strikes, known as the 'Harvest Moon' raids, between 24 September and 1 October. London was bombed during five of the six attacks. Not a single raider was shot down by patrolling fighters although the guns accounted for four, chiefly through bearings from sound-ranging equipment. Five home defence aircraft crashed on landing, including one lost during a zeppelin raid which followed the Gotha attack of 24 September.\* The defence never succeeded in putting more than thirty-three aircraft up during a raid. Towards the end of the raiding period seven or eight Camels from 44 Squadron were taking part. Most squadrons, however, made do with obsolete types. For example, 39 Squadron based at Biggin Hill and North Weald opposed the raid of 29-30 September with three BE12s, six BE2es, and two BE2cs, one of the latter being flown by the flight commander, Major J.A. Dennistoun of Winnipeg. During the six Harvest Moon raids, 151 flights were made, yet only five pilots even 'thought' they saw hostile aircraft, and only two pilots opened fire.<sup>53</sup>

These raids were the last straw for the War Cabinet. Absenteeism in munitions factories, running as high as 73 per cent, and outbreaks of panic as hundreds of thousands of Londoners thronged nightly to the Underground for shelter seemed to dictate a new policy. On 1 October Field Marshal Haig was ordered to launch bombing raids on Germany; when he objected, General Robertson replied that 'the War Cabinet have decided, in view of the air attacks on London, that it is necessary to undertake a continuous offensive, by air, against such suitable objectives in Germany as can be reached by our aeroplanes.' Haig was told to make immediate arrangements with the French for the accommodation of RFC bombing squadrons behind their lines. The result was the formation of 41 Wing at Ochey, the precursor of the Independent Air Force.<sup>54</sup>

As the British intelligence later discovered, during the Harvest Moon raids the R-plane (*Riesenflugzeug*) had been used for the first time. This giant aircraft, a multi-engined type much larger than the Gotha, had initially been employed on the Eastern Front. A squadron of the Giants, *Riesenflugzeug Abteilung (Rfla 501)*, had been transferred to a Belgian airfield, Scheldewindeke, in August 1917. The airfield had a specially constructed concrete apron to handle the six aircraft that composed the squadron, commanded by *Hauptmann von Bentivegni*.†

\* J.A. Menzies of Ottawa, an observer with 33 Squadron at Gainsborough, was killed in this crash.

† The R-plane, never mass-produced, was made in a number of types by several German factories. Those employed against England were made by the Staaken works, but since each was, in effect, hand-made, it is not possible to make specific statements about performance of the aircraft as a type. The Staaken R-VI had a wing-span of nearly 140 feet, and carried four 245-hp Maybach engines mounted in pairs, back to back. Most of the seven- to nine-man crew were housed in an enclosed plywood fuselage; only the flight mechanics, who serviced the engines in flight and doubled as gunners, were exposed to the elements in their airy cockpits in the engine nacelles.

Further raids by *Kagohl 3* and *Rfla 501* took place at the end of October and again on 6 December. In the latter raid some defence squadrons had been partially re-equipped with more efficient aircraft. Two Bristol Fighters, for example, accompanied the BE12s of 39 Squadron from North Weald; Lieutenant V.A. Lanos of Kingston, Ont., flew in one of them as an observer. It was the gunners, however, who achieved great success during this raid. Six Gothas were destroyed as a result of gun-fire: two over England, three crippled machines which crash-landed in Belgium, and one which failed to return to base.<sup>55</sup>

*Kagohl 3* was also used in Western Front operations. During the raid on the British rear areas near Ypres on 12 December 1917 the squadron lost its commander, who was in the crew of the first Gotha to be shot down over France. Captain William Wendell Rogers of Alberton, PEI, leading a patrol of five Nieuports from 1 Squadron, was responsible: 'Just after climbing through the clouds I saw two formations (9 and 8) of Gothas coming West about 7,500 feet. I climbed up with the patrol and observed one E.A. turn back East, so attacked it, firing  $\frac{3}{4}$  drum at 30 to 20 yards range. E.A. burst into flames, fell to pieces and crashed North of FRELINGHIEN [sic] ...'<sup>56</sup> Rogers' achievement was followed by the first success of a home defence aircraft at night, when a 44 Squadron pilot shot down a Gotha during the raid of 18 December 1917. Despite this victory, the defence had little to crow about. In the last three raids of 1917 131 defence aircraft went up, fifty-eight of them first-class fighters, yet the enemy was sighted only eight times and only three combats took place, for a total of one Gotha shot down. As Ashmore put it, 'a large number of pilots were risking their necks for a pitifully small result.'<sup>57</sup>

Raiding resumed on the night of 28–29 January. Although a Gotha was shot down by defence aircraft, the most notable occurrence was the loss of life and devastation caused by a 1000-kg bomb from a Giant aircraft which fell on a London printing establishment being used as an air-raid shelter. The following night three Giants returned: one was compelled by the guns to turn away from London and the other two were unsuccessfully engaged by aircraft. Two more raids on London occurred on 16 and 17–18 February, five R-planes flying in the first and one in the second. It is an indication of the slowness with which the RFC home defence squadrons were being re-equipped that of the 129 flights made during these two raids, forty-three were by Sopwith Camels, Bristol Fighters, and

Many of the mechanics who served with *Rfla 501* had come from zeppelin service where they had been familiar with the Maybach engine. The Giant tended to be somewhat temperamental from the maintenance point of view, but once committed to a raid was much more reliable than the Gotha. None of the Giants was shot down and only two were lost through accident. Although its bomb-load varied with individual aircraft, it carried more than three times the load of the Gotha, including large 1000-kg bombs. Nor was the aircraft slow. Its cruising speed was over 80 mph, and it had a range of some 300 miles. The best account of the R-plane is in G.W. Haddow and Peter M. Grosz, *The German Giants: the Story of the R-planes, 1914–1919* (London 1962). See also Raymond H. Fredette, *The Sky on Fire: the First Battle of Britain, 1917–1918, and the Birth of the Royal Air Force* (New York 1966), 132–6; and Arthur Schoeller, 'Mit dem Riesenflugzeug R27 über England!' in Walter von Eberhardt, ed., *Unsere Luftstreitkräfte, 1914–1918* (Berlin 1930), 441–4, DHist SGR 1 196, Set 81. Schoeller gives a ratio of forty ground-crew per aircraft for *Rfla 501*; the figure in Haddow and Grosz, p. 38, is 125.

SE5s, the remainder being the usual collection of BE2s, BE12s, and Armstrong Whitworths. About the same proportion of first-class fighters took part in an unavailing search for five Giants by forty-two machines during the raid of 7-8 March. Two new squadrons, 141 and 143, authorized in December 1917, came into action for the first time on this night. Captain A.E. Godfrey, now transferred from 44 Squadron to command a flight with 78 Squadron, reported that despite the blackout 'the visibility of London was perfect. The glow of the lights of London could be seen thirty miles away at a height of 12,000 ft. The river Thames could be traced by the lights on boats.' Despite the good visibility, however, the typical report was that of Lieutenant Charles Osenton of Armstrong, BC, flying with 143 Squadron from the former RNAS airfield at Detling: 'No H.A. seen.' The Giants, as always, had everything their own way; one of them dropped a 1000-kg bomb on a London residential street, wrecking most of it and causing heavy casualties.<sup>58</sup>

No further aeroplane raids took place until May. Instead, three nocturnal visitations from zeppelins, absent since October, occurred in March and April. The Naval Airship Division had not attacked during the winter because of the heavy losses suffered in its last raid and because of a fire which swept the Ahlhorn sheds in January, when five airships were lost. Moreover, the lesson of the 'silent raid' had been learned: more powerful engines were needed to cope with the high winds and rarified air encountered at great heights. By early 1918 a new power plant, the Maybach MB-IVa, with oversize cylinders and a higher compression ratio, was being installed to replace the Maybach HSLU engines, in service since 1915. At the same time two wireless stations were set up in Germany to transmit directional signals at regular intervals. Now, instead of having to break wireless silence by a request for a bearing, the airship could determine its bearing from each station by using its receiver and a trailing antenna. This innovation deprived the defence of its most valuable source of early intelligence of airship movements.<sup>59</sup>

The raid of 12-13 March was not a fair test either of the improved zeppelins or of defensive readiness, since it took place in weather so bad that few fighters took to the air. The zeppelin commanders had no clear idea of their whereabouts. On 13-14 March two of the three airships sent to raid northern England were recalled, but *Kapitänleutnant* Dietrich in L 42 persisted, bombing the dock areas of West Hartlepool from 18,000 feet. The defence was caught by surprise; Dietrich reported that the town's lights were still on when he began bombing. According to the intelligence officer of the Tees Garrison, 'the civilian population of West Hartlepool shows considerable feeling and resentment at the fact that the attack took place before T.A.R.A. [Take Air Raid Action] was given.' A month later, on 12-13 April, five naval airships attacked the Midlands at heights well beyond the reach of the defence. Among those vainly attempting to reach the zeppelins were pilots from the former RNAS station at Great Yarmouth. Like

\* The frequency of zeppelin raids on England for the remainder of the war was fundamentally determined by a high policy decision taken in August 1917. In order to conserve rubber and aluminum for the production of German army aeroplanes, it was decided to hold the total establishment of the naval airship division to twenty-five airships, and to reduce the replacement rate to one zeppelin every two months. Douglas H. Robinson, *The Zeppelin in Combat: a History of the German Naval Airship Division 1912-1918* (London 1966), 262-3

other home defence units outside the London Anti-Aircraft Defence Area, Great Yarmouth had to make do with obsolete aircraft. Lieutenant G.R. Halliday of Victoria was up more than two hours in a BE2c, but did not come within several thousand feet of the height at which the attack was delivered. The same held for the F2a flown by Captain Robert Leckie of Toronto; its service ceiling was less than 10,000 feet.<sup>60</sup>

The last aeroplane raid on England, that of 19–20 May 1918, was also the largest. Brandenburg's squadron had been increasingly employed on Western Front duties but for this attack he managed to assemble forty-three bombers, including two Giants, to raid London. The bombers, spaced at five-minute intervals, came over England from 2242 hrs until well after midnight. Against them, the defence mustered eighty-four aircraft including thirty-one Camels, twenty-eight SE5s, and fourteen Bristol Fighters. Although nearly half the bombers may have reached London, the resistance offered was strong and effective. Seven enemy aircraft were lost to the fighters and guns of home defence. Though no Canadians were successful in shooting down enemy aircraft, several took part in the night's action, including three pilots experiencing their first night-fighter operation, Lieutenants W.M. Partridge of Winnipeg from 50 Squadron, F.B. Baragar of Elm Creek, Man., from 112 Squadron, and S.H. Love of Toronto from 39 Squadron. Love was forced to crash-land his Bristol Fighter near his home field of Hainault Farm.<sup>61</sup>

German bombers did not attack England again during the First World War, not because of their losses, heavy though they were, but because the need to support the German armies in the field was more important to the High Command than the continuation of strategic bombing against England. The RAF had to assume that further attacks would be forthcoming, and so continued to strengthen the home defence organization until war's end. The single most important development was the installation of wireless receiving sets in aircraft in September, making possible the manoeuvring of defence forces in the air while a raid was actually in progress. Information about hostile aircraft movements reaching a central control in London was plotted on a large table-map, over which sat General Ashmore and the Director of Fighter Operations, Brigadier-General Higgins, the commander of what was now VI Brigade. 'In effect,' Ashmore later wrote, 'I could follow the course of all aircraft flying over the country as the counters crept across the map.' Higgins had direct command lines to his squadrons and to a long-range transmitter at Biggin Hill. 'This transmitter was used for giving orders to leaders of defending formations in the air, during day time ... For night work, until the individual pilots should be thoroughly trained in wireless receiving, we confined ourselves to a simple system. Each squadron commander, as he received information of the enemy through the central control, was able, with a short range wireless transmitter, to concentrate his machines in the air at any part of their patrol line, and at any named height.'<sup>62</sup>

These methods were not far removed from those to be employed against the Germans during the Second World War. Ashmore did not consider that the problem of the bomber had been solved; indeed, in the complex inter-relationship between offence and defence, there could never be, in his view, anything like 'complete immunity' from bombing. It seems doubtful that the various defensive

measures taken during the war accomplished anything more than forcing the enemy to change his form of attack. Ashmore was convinced, nevertheless, of the deterrent value of the British air defence system. The fact is that the German decision to abandon further aeroplane raiding had nothing to do with the substantial improvement in British air defences. Yet the mere threat of a resumption of bombing was sufficient to maintain in being an elaborate defensive organization. At the end of the war the operational units of VI Brigade, with its headquarters in London, comprised eleven squadrons of aircraft and three balloon squadrons in the Southern Group (London Anti-Aircraft Defence Area) and five more home defence squadrons in the Northern Group. The number of men required to operate the ground defences, including headquarters staff, searchlight and sound-ranging crews, gunners and support staff, was 15,115.<sup>63</sup>

In July 1917, in response to Chancellor Bethmann-Hollweg's denunciation of German raids on England as 'irritating the chauvinistic and fanatical instincts of the English nation without cause,' *Feldmarschall* von Hindenburg had replied: 'We must ... prosecute the war with all our resources and the greatest intensity. Your Excellency deprecates the aerial attacks on London. I do not think the English nature is such that anything can be done with them by conciliation or revealing a desire to spare them. The military advantages are great. They keep a large amount of war material away from the French front and destroy important enemy establishments of various kinds. It is regrettable, but inevitable, that they cause the loss of innocent lives as well.'<sup>64</sup>

Although it is true that casualties and property damage caused by German raiding were not great when measured against the immense loss of life and property in the battle zones of the armies, the German objective of tying down a significant part of the British aerial forces at relatively small cost was certainly achieved. Even leaving out of the calculation the production losses caused by absenteeism in war factories, and taking into account that a portion of the manpower needed to support the defence organization was not fit for military service overseas, it remains true that more than two hundred first-class fighter aircraft and the crews to man them were unavailable to the British forces on the Western Front for the greater part of 1918. Weighed against this consideration, and in a sense supporting the position of Bethmann-Hollweg, is the fact that German air raiding had a direct bearing on the formation of the RAF, the creation of the Independent Air Force, and the launching of a strategic bombing campaign against Germany, though that, too, could be regarded as a diversion of effort from the main battle zone.

With the exception of the numerous Canadians on RNAS home stations, the number taking part in the defence against German raids was never large, although it rose steadily throughout the war, and sharply in 1918. At the end of 1916 there were only eight Canadians flying with the eleven home defence squadrons then operational. By December 1917 there were thirty-one. From 1 September 1917 to the Armistice a total of 145 Canadians were posted to home defence. Of these, thirty had previous operational experience as pilots and five more as observers. A majority of this group probably passed through the operational night training provided by the home defence squadrons before being posted to other operational units, or to another home defence squadron. It is no longer possible to determine

accurately the precise status of those listed on squadron strength returns from this period. Even so, it is evident that by the closing months of the war Canadians were serving in VI Brigade in numbers far exceeding those reached at any earlier period. The jump in their numbers was probably related to the output of the RAF's training programme in Canada.<sup>65</sup>

Despite their relatively small numbers, Canadians gave an excellent account of themselves, especially against the zeppelin. Of the twelve shot down by British aircraft in the course of the war, six were accounted for by Canadians, single-handedly or as part of a team. And a Canadian was to figure prominently in the dramatic climax to zeppelin raiding on England.<sup>66</sup>

In July 1918 an enormous airship of a new type made her maiden flight at Friedrichshafen. L 70 was nearly 700 feet long and her huge envelope had a gas capacity of 2,195,800 cubic feet. Driven by seven of the new Maybach MB-IVa engines, she was the fastest airship yet produced, with a maximum trial speed of 81 mph, a dynamic ceiling of 23,000 feet, and the capacity to carry at least four tons of bombs.<sup>67</sup> Peter Strasser did not allow his new weapon to rust. On the afternoon of 5 August five airships left their North Sea bases. L 70 was among them and accompanying her commander, *Kapitänleutnant* von Lossnitzer, was Strasser. But the weather was scarcely suitable for a zeppelin attack. Air temperatures over England were high and the barometer level low, sharply reducing the potential ceiling of the airships. Moreover, an anticipated westerly wind faded and the airships closed on the English coast sooner than had been estimated. Their presence was reported by a lightship while they were still off the Norfolk coast and the alert spread throughout the northern home defence network.

At Great Yarmouth air station most of the flying personnel, including the station commander, had gone off to town for the evening. On receiving the warning, the acting commanding officer, Captain Robert Leckie, proceeded to round up the missing airmen and at the same time to ready sufficient aircraft for them. Captain C.B. Sproatt, like Leckie from Toronto, was walking on the seaside boardwalk when he looked up and saw a zeppelin – 'there it was in the evening sky as plain as anything could be.' He flagged down a motorcycle, hopped into the sidecar, and sped off to the station. Sproatt had been flying a DH4 with a Rolls-Royce 375-hp Eagle VIII engine and was intent on getting it into the air. He was forestalled by Major Egbert Cadbury. Cadbury had been attending a concert party when he got the word. 'Knowing that there was only one machine available that had the necessary speed and climb,' Cadbury recalled, 'I roared down to the station in an ever-ready Ford ... and semi-clothed ... sprinted as hard as ever Nature would let me, and took a running jump into the pilot's seat.' According to Cadbury, he defeated Sproatt by a fifth of a second. No observer having appeared, Cadbury shouted to Leckie (who was not supposed to be flying) to jump into the rear seat, and the DH4 took off. Joining them were thirteen other aircraft from Great Yarmouth and its subsidiary fields, including two other DH4s, five DH9s, a Large America flying-boat, and five Camels. In addition to Leckie and Sproatt, three other Torontonians, Captain George Dennison Kirkpatrick and Lieutenants W.K. Prendergast and E.R. Munday, joined in the frenzied scramble into the air.<sup>68</sup>

Immediately after take-off Cadbury sighted three zeppelins in a 'v' formation about forty miles out to sea. Leckie could scarcely credit the sight. As he wrote a few days after: 'I am still astounded at the audacity of the German Commanders in bringing their ships so close to the Coast of England in broad daylight. I can only conclude that their navigation must have been seriously adrift.' After an hour's chase the DH4 closed up to L 70 and about six hundred feet below her. In Cadbury's words, 'my Observer trained his gun on the bow of the Airship and the fire was seen to concentrate on a spot under the Zeppelin  $\frac{3}{4}$  way aft.' The Pomeroy bullets tore a great hole in the fabric and the fire ran the whole length of the stricken monster. L 70 'raised her bows as if in effort to escape, then plunged seaward a flaming mass.' Leckie reported later that the shooting from the zeppelin 'was as usual very bad,' which he put down to poor training in deflection firing and to the fact that the DH4 'must have been practically invisible against the dark clouds beneath us.' Though his gun had no sight, his tracer enabled him to bring his fire to bear after he had missed his huge target with the first five rounds.<sup>69</sup>

As Cadbury turned to pursue the two remaining zeppelins, he experienced temporary engine trouble. When the engine recovered the powerful DH4 moved in on one of them. An attack was made 'bow on,' and when Leckie opened fire a blaze of light was seen briefly in the amidships gondola. (The blaze of light, which the two had thought was a fire aboard the airship, resulted from a crewman inadvertently releasing a black-out curtain. It was immediately extinguished.) At this point Leckie's gun jammed. While he tried to clear the stoppage with frozen fingers (in the rush to take off, he had brought no gloves), L 65 made her escape. In this fashion, and with the death of its commander in L 70, the German Naval Airship Division ended the raiding of England. In a letter to his father, Egbert Cadbury wrote: '... another Zeppelin has gone to destruction, sent there by a perfectly peaceful "live-and-let-live" citizen, who has no lust for blood or fearful war spirit in his veins. It all happened very quickly and very terribly.'<sup>70</sup> Doubtless Cadbury's ambivalence stemmed from his Quaker upbringing. All zeppelin fighters, however, whether British or Canadian, were similarly affected by the peculiar horror of an airship in its death throes.

## The RNAS and the Birth of a Bombing Strategy

The first British long-distance bombing force, 3 (Naval) Wing (sometimes known as the Luxeuil Wing), had the highest Canadian participation of any air formation in the war, because it was formed just as the first sizeable group of Canadians finished their training. The Luxeuil Wing has received cursory treatment in general histories.<sup>1</sup> There are good reasons for this. Its limited resources, and the shortcomings of the air weapon itself, meant limited results. The force had no clearly stated objective and its operations have been overshadowed by those of its successor, the Independent Force. Yet the wing and its work did have considerable significance. It was created partly as a result of the influence of public opinion upon policy; it operated independently of other fighting arms; it directly co-operated with an allied force, the French Air Service; and it specialized in one thing: strategic bombing.

Because strategic bombing was rarely anything but indiscriminate, and because very often its targets were those another age (one which died during the First World War) would have termed non-military, there has been no rush of candidates to claim credit for having originated the idea. A favourite slander, echoed even by the British official history, attributed the practice of bombing non-military targets to German 'frightfulness.'<sup>2</sup> But Germany had no monopoly upon that commodity. A differing national style and political system dictated that Britain would engage in more soul-searching debate than did Germany, but in the end the British became whole-hearted advocates of 'strategic bombing,' for many of the same reasons that the Germans did.

Although the wing is very much part of Canadian air history, as with virtually every other instance of Canadian participation in the war in the air the airmen involved were masters of their fate only at the tactical level. The policy that placed them at Luxeuil, and indeed the entire debate about strategic bombing, was British, and it deeply divided opinion, whether public, political, or military-professional. At the level of policy, men were torn between moral scruples and the belief that German air raids upon England demanded retaliation from a proud people. Among the military, some took the view that bombing was a weapon of high potential that should be exploited to the maximum extent, possibly as a way to circumvent the stalemate on the Western Front, while others were dubious about the weapon and believed, in any event, that tactical needs and Haig's often desperate shortage of aircraft should be given primacy.

The debate was full of confusion and misconceptions as well, mostly on the side of the bombing enthusiasts whose hopes invariably outran the true capabilities of the air weapon. The belief that Germany could be defeated by bombing, held by some in high places and at least abetted by high-ranking military professionals, was illusory and fantastic, a product of the horror of the trenches and a wishful readiness to accept extreme claims for a solution to military stagnation. Even those who had a more limited view of the potentialities of bombing and who simply believed that air attack upon key German industries could make a substantial contribution to victory were victims of illusion. It was but a short step to argue for attacks upon the industrial labour force and to broaden the definition of a military target from the war industry to the people manning it.\* Whatever the merits of their arguments, it is a fact that the advocates of strategic bombing triumphed over their opponents: an independent bombing force and its corollary, a separate air force, were created, partly at the expense of Haig's air strength on the Western Front.

The origins of this development are to be found in the activities of the RNAS. Spurred on by Winston Churchill, an enthusiastic believer in hitting zeppelins at their bases, the RNAS had undertaken the first long-distance raids in 1914. It was Churchill, too, who had authorized the design and construction of the Handley Page heavy bomber in December 1914 and who had urged the Admiralty Air Department to develop the capability to carry large amounts of explosives deep into enemy territory. Both at Dunkirk and the Dardanelles bombing became a chief task of the RNAS units. Even when Churchill and Fisher left the Admiralty, and air development in important respects languished, Rear-Admiral Vaughan-Lee continued to push the expansion of the aeroplane for long-distance bombing. By the end of 1915 the nucleus of a bombing squadron was under training at Detling, commanded by the British pilot who had successfully bombed airship sheds in Düsseldorf in September 1914. All the other airmen at Detling as of 18 December 1915 were Canadian. Meanwhile, the RFC subordinated bombing to artillery observation and reconnaissance and confined it to the tactical level. In October 1915, anticipating the acquisition of Sopwith 1½ Strutters, Trenchard considered the possibility of reprisals for the German zeppelin raids, an idea that got short shrift from Haig's staff: 'Reprisals are rarely effective in stopping the enemy permanently from taking any particular course,' one of them minuted.<sup>3</sup>

In France units specializing in bombing had an early start. The French had formed their first *Groupe de Bombardement* on 23 November 1914. Initially consisting of three squadrons of six Voisins each, by June 1915 the force had swollen to four groups, twenty-one squadrons, and 126 aircraft. Strategic objectives were at least part of its mission, since as well as attacking enemy lines of communication it was also directed against enemy industry with the special aim of demoralizing German workers. Concentrated at Malzéville, near Nancy, the force carried out long-distance raids on industrial targets in the Saar, Moselle, and Rhine valleys. Demands from the front put a stop to this precocious development. After September 1915 the force was broken up, and many of its aircraft were converted

\* The Germans always claimed that their raids were upon specific military objectives, but of course they, like the British, necessarily engaged in indiscriminate bombing of built-up areas and frequently released their bombs through intervening cloud layers.

to gun-buses (*avions-canon*) armed with 37-mm Hotchkiss guns for strafing trains and troop columns. Only two squadrons remained to continue the bombing of industrial targets from their base at Belfort.<sup>4</sup>

As we saw in the last chapter, German air raids set off a rising demand in England for reprisals. In the House of Commons W. Joynson-Hicks had suggested in February 1916 that a few bombers with the range to attack Essen, Cologne, and the Rhine bridges 'would go a long way towards ending the war.' After the raid of 3 April on London, N. Pemberton Billing protested 'this affront to our national dignity, and this blow at our national life.'<sup>5</sup> On 17 May, in the course of an attack upon the Admiralty's 'navalization' of the RNAS, Winston Churchill lent his eloquence to the cause of strategic bombing. 'The air is free and open,' he pointed out: 'There are no entrenchments there. It is equal for the attack and for the defence. It is equal for all comers. The resources of the whole world are at our disposal and command. Nothing stands in the way of our obtaining the aerial supremacy in the War but yourselves. There is no reason, and there can be no excuse, for failure to obtain that air supremacy, which is, perhaps, the most obvious and most practical step towards a victorious issue from the increasing dangers of the War.'<sup>6</sup> He gave much the same advice to the Air Board, telling its members that the RNAS was 'being run on the little "Navyite" principle.'<sup>7</sup>

In terms of bombing the RNAS was certainly abreast of parliamentary opinion. The naval initiative to bomb industrial targets from Dunkirk in February had brought RFC protests and was a factor in the creation of Lord Derby's Joint War Air Committee. When the committee examined the RFC charges of RNAS poaching and found that while the Admiralty had surplus material, the War Office did not, it reached an important conclusion: 'Although co-operation between the two Services in long-range operations is ultimately desirable, the Naval programme for aircraft suitable for such raids should not be delayed until the Royal Flying Corps is ready to co-operate.' Having in mind Haig's shortage of seven squadrons, the committee nevertheless declared that support of the army and the fleet should be the first supply priority. Only after their requirements were met should long-range offensive operations be favoured. Home defence was given the next priority.<sup>8</sup>

Although the committee had thus backed in general terms the idea of a bombing offensive, it also considered arguments which were distinctly sceptical about the merits of this type of attack:

Opinion has been misled by the air raids against towns, munitions factories, aerodromes, etc., which are really secondary operations as were the raids of German ships across the North Sea for somewhat similar purposes. Those raids tended to weaken the German main fleet and were thus unsound in principle. The false ideal engendered by basing policy on the secondary operation instead of on the primary tends not only to mistaken strategy but to the production of ships and air machines unsound in principle. The force produced in view of the primary operations will probably cover the needs of the secondary ones.<sup>9</sup>

This view was challenged by Vaughan-Lee, who argued that an organized and systematic attack on Germany from bases in France was the right response to zeppelin raids and would have the strategic effect of drawing German air strength from the front. He suggested an approach to the French government for co-

operation and requested from the Admiralty terms of reference which, 'speaking sensibly,' would amount to 'a free hand all round.' On the day that Derby handed in his resignation, the naval members of the committee underlined their rejection of his work by calling for full prosecution of long-distance bombing.<sup>10</sup>

The Admiralty adopted Vaughan-Lee's proposals and an invitation was procured from France to co-operate in bombing operations. On 1 May the Admiralty, which had worked through the French naval attaché in London without reference either to the War Office or the War Cabinet, sent Wing Captain W.L. Elder to Paris to discuss the proposal. On 5 May the personnel and aircraft of the new bombing force moved from Detling to Manston, becoming 3 (Naval) Wing (the original 3 Wing having been disbanded after withdrawal from Gallipoli).<sup>\*</sup> On 16 May the first advance party went to Luxeuil-les-Bains in order to prepare the necessary facilities. By using the French base it would be possible to bomb German targets without flying over neutral territory – this was why the wing did not operate from southeast England, which would have meant flying over Holland.<sup>11</sup>

Conflicting requirements in France delayed Elder's preparations. At Dunkirk Wing Captain C.L. Lambe, strongly supported by Vice-Admiral Bacon, requested and received immediate reinforcements to counter growing enemy air strength in Flanders. In preparation for the Somme offensive the Admiralty had already agreed to divert sixty aircraft to the RFC. Thus it was not until late July that Elder was able to gather sufficient personnel and equipment for limited operations in conjunction with the French, and not until October that his wing was fully able to commence operations on its own.<sup>12</sup>

Elder's terms of reference were drawn up on 27 July, although they may not have been received by him until after the first raid, in which two Sopwith 1½ Strutters joined with French forces in attacking the benzine stores at Mülheim on 30 July. The instructions allowed Elder the 'free hand all round' which Vaughan-Lee had sought. The Admiralty was to play little part in target selection, which was left to the French, but wished merely to be kept informed of 'the general lines of your proposed operations.' Elder was told that he was always to obtain the consent of the 'General Officer Commanding the French Armies' for any planned operation. Naturally the Director of Air Services and the Sea Lords also wished to know of any disagreements with the French. The wing's situation, after all, was dependent upon French sufferance and co-operation. Thus, in September, when Squadron Commander H.A. Williamson tried to persuade the Admiralty to attack Friedrichshafen he was told: 'The French are not particularly anxious for us to carry out the raid and, due to other matters of much greater import, we do not wish to press them in any way for the present at any rate ...'<sup>13</sup> If Vaughan-Lee's 'systematic' attack upon German cities was to be carried out, it would not be as the result of Admiralty planning and control.

Two paragraphs of Elder's instructions were of special interest:

\* Canadians in the wing when it was reactivated were F.C. Armstrong of Toronto (KIA 25 March 1918); P.E. Beasley of Victoria; A.O. Brissenden of Halifax; S.T. Edwards of Carleton Place, Ont.; G.R.S. Flemming of Toronto (shot down and died of wounds on 14 April 1917); E.C. Potter and F.E. Fraser of Winnipeg; J.A. Glen of Enderby, BC; A.B. Shearer of Neepawa, Man.; L.E. Smith of Mystic, Que. (KIA 25 Feb. 1917); D.H. Whittier of Victoria (killed in a flying accident in July 1916); and G.K. Williams of Toronto (killed in a flying accident in June 1916).

4. It should be laid down that, as a general rule, the objectives should be of military value and promiscuous bombing of unfortified towns should on no account be permitted.
5. It should be borne in mind that it is a bad policy to attack an important objective, until you have sufficient force at your command to make the attack effective. To attack important objectives with small forces only serves to put the enemy on his guard.<sup>14</sup>

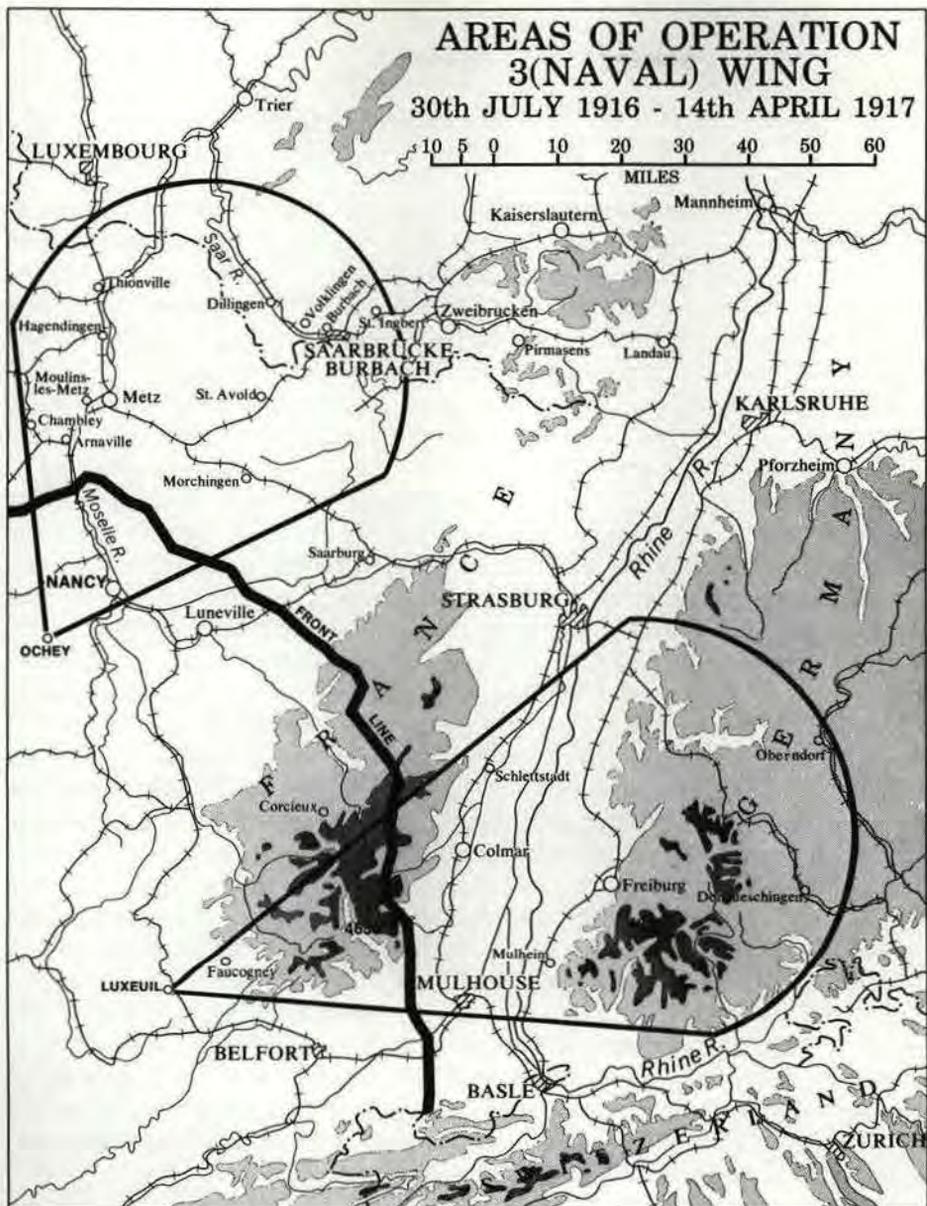
The first paragraph has a touch of the Nelsonian blind eye, though it may well be that no one at the Admiralty appreciated that the bombing of cities was of necessity 'promiscuous.\*' The second was wise counsel, yet it must be said that the force required to render bombing truly effective was vastly larger than the Admiralty imagined, or Elder was to command.

Aircraft of the naval wing carried out all their raids between 30 July 1916 and 14 April 1917. For much of the time Nancy or Ochey, rather than Luxeuil, served as the base – a development that played an important part in target selection. From Luxeuil aircraft could easily fly to the Belfort Gap, which opens up between the Jura and Vosges mountains. Beyond lay the Black Forest, and only on the other side of that inhospitable terrain were the factory towns of the German homeland. From Ochey and Nancy, in contrast, situated as they are in the heart of Lorraine, it was easily possible to reach any number of targets in the highly industrialized valleys of the Saar and Moselle rivers. The targets to be attacked from Luxeuil in the ensuing months – Mülheim, Oberndorf, and Freiburg – were farther away, more difficult to reach and of lesser industrial significance. The raids from Luxeuil were carried out at ranges between sixty and a hundred miles; those from the more northerly airfields were carried out at ranges between thirty and seventy miles.

The first major operation, which falls into a special category, was the raid of 12 October. On 3 September the commander of the French aviation service, *Lieutenant-Colonel Barés*, ordered *Capitaine Happe*, commanding the French bombing squadrons now at Luxeuil, to bomb the Mauser rifle factories at Oberndorf. Wing Captain Elder agreed to participate with all the aircraft and pilots then available. The French squadrons were not ready to undertake so ambitious a project until 11 October, however, so 3 Wing was able to accumulate more strength while it waited for the French and to engage in intensive training for the operation.<sup>15</sup>

The 220 miles of cross-country flying was a particular challenge for the pilots. They were given a route direct to Oberndorf, returning by way of Schlettstadt and Corcieux (a French aerodrome).<sup>16</sup> The wing had been organized into Red and Blue Squadrons, each broken up into two flights of bombers with escorting fighters. Two pilots who had flown to Mülheim in July, the Canadians J.A. Glen

\* Current sighting equipment (the CFS bomb-sight) and technique required a bomber to approach the target directly up- or down-wind while the bomb aimer used a stopwatch to measure his speed by two sights of one object on the ground and then set the movable foresight on a timing-scale to correspond with the observed time interval between the two measured sights. C.B. Sproatt of Toronto, who was a flight sub-lieutenant at Dunkirk towards the end of 1916, has recorded that '... the bombsights were so bad ... that an experienced pilot could do better bombing without a sight than he could with one.' W.A.B. Douglas, taped interview with Sproatt, 22 Dec. 1968, transcript, 28, DHist 74/43



and E.C. Potter, were the only members of the wing who had first-hand knowledge of some of the terrain. Both flew bombers in 'A' flight of the Red Squadron. Red Squadron consisted of Sopwith 1½ Strutters; Blue Squadron had one flight of 1½ Strutters and one of Bréguet vs.\* Both French and British aeroplanes took off in their flights at fixed intervals, circling to rendezvous above the aerodrome before setting course for the target.

The mixture of obsolescent Bréguet vs and the relatively up-to-date Sopwith 1½ Strutters in the wing created a number of problems. The Sopwith was an impressive machine for its day, even though the two-seater fighter versions on the Somme had finally met their match in September. The synchronized Vickers gun on the engine cowling and the ring-mounted Lewis gun in the observer's seat provided an unusually strong armament. The single-seat bomber version, fitted with internal tandem carriers designed to carry two 112-lb bombs but also capable of carrying four 65-lb bombs when the vanes were cut down, had a slower rate of climb than the fighter (over twenty-four minutes to 10,000 feet compared to seventeen minutes, fifty seconds) but could maintain slightly better speed. The Bréguet v was so radically different from either version of the Sopwith that it was clear to Wing Commander R. Bell Davies he could not hope to mount a co-ordinated bombing strike without exceptional allowances. The outdated Bréguet took twice as long as the Sopwith to reach altitude (forty-nine minutes to 10,000 feet) and was about 15 mph slower than the British machine. It was unstable fore and aft, slow on turns, and almost impossible to fly on instruments. This lumbering machine did have one virtue, however – a good arc of fire from the forward nacelle. Perhaps remembering the performance of FE2bs in combat, Bell Davies thought that if the squadron could meet an attack without breaking formation some measure of safety could be achieved. He was prepared to test the theory in action, provided fighters escorted each Bréguet flight.<sup>17</sup>

What kinds of formation could best protect bombers against enemy fighters, faster, more manoeuvrable, and perhaps better armed than they? The solution adopted was the first British attempt to come to grips with this fundamental problem of bombing operations. In a formation of six, including a single fighter escort, the Sopwiths were staggered in height, increasing by 150 feet towards the rear, with the fighter about 750 feet above the leader in the opening of the 'v' behind the formation. The Bréguets, in flights of six, formed a triangle with the machines staggered downwards in height so that they could cover each other. The formation gave these slow aircraft the maximum amount of mutual protection, buttressed by two or more fighters stationed behind and above them.

Much effort had gone into practising the rendezvous and formation, which were essential to success. For the two flights of the Red Squadron the process was completed without incident. They proceeded to the target according to plan but on the return journey one of the bombers was attacked by an enemy machine. Flight Sub-Lieutenant Raymond Collishaw recorded how 'When at 12000 [feet] 10 miles across the Rhine, dived at a Hun with full engine, firing machine gun, to protect Butterworth from attack. When closing the enemy my motor cut out completely,

\* The Bréguets had been acquired when it was clear that Short Bombers would not be available.

veered away and got my motor again at 900 revs, recrossed the lines at 6000 ft. and returned to Luxeuil. Shot down one Fokker Scout over Rhine.<sup>18</sup> A subsequent inspection of his engine by the ground crew revealed that the distributor was damaged and that the lead to one plug had broken. As for Flight Sub-Lieutenant C.H.S. Butterworth, of Ottawa, his bomber was hit in the engine by the Fokker D-II that attacked him, but he was able to glide to a landing on a German airfield at Freiburg. By the time the Blue Squadron took off, heavy banks of clouds had moved in. The Sopwiths failed to rendezvous. One crashed at Faucogney twenty-five minutes after take off; the other three eventually returned independently to the landing field. Flight Sub-Lieutenant L.E. Smith of Mystic, Que., part of the Bréguet's escort for this flight, joined Wing Commander Bell Davies and Flight Sub-Lieutenant R.F. Redpath of Montreal, who were awaiting the Bréguets above the clouds. After an anxious delay, Davies 'saw a disturbance in the white layer below and the top plane of a Bréguet appeared. The machines came out one by one looking like a string of hippos emerging from a pool.'<sup>19</sup>

The raid was an instructive experience. German air defences were perhaps more effective than anticipated. The first allied flights reached Oberndorf without being intercepted, but later French flights were attacked by German aircraft, including slow reconnaissance machines.\* The Bréguets, which bombed Donaueschingen, thinking that it was Oberndorf, lost two of their number to German air attacks over Alsace. Had it not been for the watchfulness of their fighter escorts, all of them might have had to land in Switzerland, where their crews would have been interned. Bell Davies thought they were drifting over the Swiss border as they flew home and Flight Sub-Lieutenant Redpath apparently recognized the terrain. He flew out in front of the formation and made a sharp turn, leading the bombers back to a safe course. The four surviving Bréguets had to land in pitch darkness, but they all reached friendly territory.<sup>20</sup>

The Board of Admiralty derived much satisfaction from the initial reports. '... I trust a good start has been made,' wrote the Third Sea Lord:

These raids should have the result of withdrawing large numbers of enemy's machines from the front as well as men and munitions just as the Zeppelin raids have accomplished against us; & this quite in addition to actual damage which may be caused to important works.

Incidentally, the lighting of German Towns is now being restricted & special prayers in the Churches, so there is immense moral effect as well.<sup>21</sup>

The First Sea Lord, Admiral Sir Henry Jackson, pointed out that such raids, having 'a strategical value & also a moral one,' should be kept up as long as weather permitted and opportunities arose. The First Lord, A.J. Balfour, noted these comments with apparent approval.<sup>22</sup>

French reaction was quite different. For them, the raid had been a disaster. Two out of twelve Farman XL-IIs and four out of seven Bréguet Michelin IVs had

\* One squadron of Fokkers was based at Freiburg for air defence; other squadrons were based near Colmar for reconnaissance and artillery co-operation over the lines.

been shot down; a Bréguet V borrowed from the RNAS had met with a similar fate. The famous *Escadrille Lafayette* had provided a measure of protection, but the limited endurance of their Nieuports had prevented them from remaining with the bombers for very long. Consequently, even a humble German AGO C-1 aircraft was able to shoot down one of the Bréguet IVs. 'It is permissible to state,' ran the French report, 'that raids of a very great distance can be carried out with very few losses if the [Farman and Bréguet] Squadrons ... could be transformed into Sopwith Squadrons and could work with the English.'<sup>23</sup> Whatever the results at Oberndorf (these proved to have been disappointing), and whatever the weather, so long as French aircraft did not improve further opportunities for raids like this one were not going to arise. It was this realization that led directly to the next phase of 3 (Naval) Wing's operations.

It was partly because the French decided not to attempt any more daylight raids for the time being, and partly because weather made Luxeuil-based operations almost impossible, that both French and British bombing forces shifted to the advanced base at Nancy. From there they hoped to deliver successive day and night attacks on industrial targets. The first took place on 22 and 23 October against the Essingden steel works at Hagendingen, about forty miles north of Nancy in the Moselle Valley. Following a night attack by the *4e Groupe de Bombardement*, two flights of Sopwith bombers escorted by six fighters set out. One bomber crashed taking off. The remainder found the target and reported dropping at least thirty 65-lb bombs on the factories and blast furnaces at the objective. The Germans put up heavy anti-aircraft fire, but not many aircraft rose to challenge the intruders. Those that did failed to press home their attacks.<sup>24</sup>

Wind and rain grounded all aircraft for the next two weeks. During this period the RNAS aircraft moved to Ochey, about twelve miles southwest of Nancy, a transfer that was not, in every case, as simple and uneventful as might be expected. As Raymond Collishaw recorded, he

... was detailed to ferry a new machine from Luxeuil to the new base and took off without a gunner in the rear cockpit. Enroute I was jumped on by enemy fighters and a bullet passed through my goggles, temporarily blinding me. Diving into German territory, I shook off my pursuers momentarily, but they caught up with me and I flew deeper into Germany in an effort to shake them off. Finally I did so, and after flying back towards French territory prepared to land at an aerodrome I saw below. I put down and taxied in among the aircraft parked on the ground, and then it dawned on me that they bore the German Iron Cross marking! I jammed the throttle forward and managed to take off, although I clipped off the tops of two trees close to the field.<sup>25</sup>

The new airfield was less cluttered and probably in no worse condition than the one they were leaving. The only damage suffered on the raid of 23 October had been caused by one bad take-off and three rough landings resulting from the appalling state of the ground at Nancy. Wing Captain Elder, realizing that the move to an advanced base would be more or less permanent, ordered the setting up of huts and workshops at Ochey. When the weather cleared up on the night of 9 November there were three flights of bombers and about eight fighters ready for

operations. They were called upon to launch daylight raids, following night raids by the French, for the next three days. The targets were the steel works at Völklingen and St Ingbert in the Saar Basin, sixty to seventy miles distant. On 10 November nine bombers escorted by eight fighters dropped thirty-five 65-lb bombs on Völklingen; on 11 November fourteen bombers escorted by seven fighters dropped more than fifty bombs on the same target in weather conditions that were rapidly deteriorating. Stiffer air defence was now being encountered and some of the Sopwith pilots were lucky to escape unharmed.\* On 12 November nine bombers escorted by seven fighters, hampered by the ever thickening haze, attacked the steel works at St Ingbert. All aircraft returned.<sup>26</sup>

Bad weather, and the fact that the 130-hp Clerget engines built in England were wearing badly and developing excessive tolerances, prevented further attacks until 24 November. By that date nine bombers with seven fighters were able to bomb the blast furnaces and iron works at Dillingen. As before, there were no casualties. Wing Captain Elder announced the intention of continuing raids on this target until it was destroyed, but not for another month did the weather again permit effective bombing. The chief problem was low visibility which made recognition of the target from 7000 feet impossible, while a combination of anti-aircraft fire and balloon barrages made bombing from lower heights impracticable. Compounding this difficulty was the condition of the ground at Ochey. '... unless it is frozen,' reported Wing Captain Elder, 'it is almost impossible for machines to get off owing to the depth of the mud: accidents to propellers are frequent.' His remarks were borne out on 27 December, when eleven bombers and five fighters set out to raid Dillingen. One of the fighters trying to take off broke a propeller on the field. Although nine bombers reached the target, haze and clouds hampered observation. Nevertheless, the effort to reach the target aroused sufficient admiration to make the wing's commanding officer gloss over such dubious results. '... as the target is a large one,' Elder wrote blithely, 'it is probable that many bombs reached the Objective.'<sup>27</sup>

In January only one raid took place, against Saarbrücke-Burbach. It was in this raid that the first serious RNAS casualties occurred. Flight Sub-Lieutenant M.H. Stephens of Toronto landed without realizing a bomb was hung up in the rack. It exploded while mechanics were handling the aircraft. Three of them were killed and Stephens lost a leg. In the freezing weather only sixteen of twenty-four aircraft had reached the objective and five severe cases of frostbite were reported after the raid. Even more significant was the difficulty of running aircraft engines in low temperatures. Early in February, when the temperature appears to have fallen well below freezing, it was found impossible even to start the engines.<sup>28</sup>

It was not until 25 February that the wing again launched a raid, this time with twenty aircraft against the iron works and blast furnaces at Saarbrücke-Burbach. German air defence was apparently becoming increasingly effective, and L.E.

\* It was on the raid of 11 November that Flight Sub-Lieutenant G.S. Harrower of Montreal (WIA 23 Sept. 1917) became separated and, unsure of his position, flew in a westerly direction until he could be certain that he was clear of the enemy lines. When he landed he found that he had succeeded so well in his aim that he was at Dijon, more than 100 miles southwest of Ochey.

Smith and his gunlayer were shot down and killed on this raid; Winnipegger E.C. Potter was lucky to glide to a forced landing behind French rather than German lines. On 4 March two squadrons of seven bombers and three fighters each tried again but the raid was not one of 3 Wing's more successful ones. Five of the bombers returned with engine defects and one bombed the railway station at St Avold instead of the designated target. Ten German aircraft in formation attacked the Sopwiths, prompting Wing Commander C.E. Rathbone (who had taken over from Bell Davies) to conclude that 'the enemy appears to be collecting machines for the protection of the Saar Valley.' A third attack by seven bombers and four fighters was attempted on 16 March. Flight Sub-Lieutenant J.E. Sharman of Oak Lake, Man., leading the raid, decided to divert to the alternative target of Morchingen aerodrome because the wind was too strong to reach the Saar Valley. Only one more raid of this nature was carried out by the Sopwiths, on 22 March, again against the blast furnaces at Saarbrücke-Burbach. On this occasion six bombers and three fighters took part.<sup>29</sup>

By this time several important developments had begun to exert their influence on the Luxeuil Wing. Aircraft production was not maintaining pace with RFC requirements on the Western Front, and the RNAS was being called upon to place fully equipped and manned fighter squadrons at the disposal of RFC headquarters. This was a crisis that not only prevented the expansion of the wing to its planned size, but actually forced the Admiralty to reduce the existing establishment. At the end of January 3 Wing pilots began transferring to Dunkirk for duty on the Western Front. The first group of nine left at the end of January, and a second group of nineteen in March.\* After their departure nineteen Canadians still remained with the Luxeuil Wing. Sixteen of them were Sopwith pilots; the others, two observers and a pilot, were attached to the wing's Handley Page 0/100s.

The Handley Page became the most important British bombing aircraft in the war, but not before it had suffered extraordinary growing pains. The RNAS had begun trials with the aircraft on 17 December 1915. Flight Lieutenant J.T. Babington, with an engineer who was to be intimately concerned with the Handley Page development, Lieutenant-Commander E.W. Stedman,† carried out the first flights for the RNAS, formed the first Handley Page squadron, and also flew the aeroplane into battle for the first time more than a year later. The designers had to overcome defects in the dynamic stability of the aircraft and it was not until October 1916 that the first production model reached an operational unit. To airmen accustomed to Sopwiths it seemed like 'a grotesque giant ... as though a fifty-

\* Canadians in the first group were F.C. Armstrong of Toronto (KIA 25 March 1918), R. Collishaw of Nanaimo, BC, J.S.T. Fall of Hillbank, BC, P.G. McNeil of Toronto (KIA 3 June 1917), J.J. Malone of Regina (KIA 30 April 1917), and A.T. Whealey of Toronto. In the second group were G.B. Anderson of Ottawa, P.E. Beasley of Victoria, A.W. Carter of Calgary (WIA June 1918), W.H. Chisam of Edmonton (WIA 8 April 1918), S.T. Edwards of Carleton Place, Ont., N.D. Hall of Victoria (POW 3 Sept. 1917), M.R. Kingsford and G.D. Kirkpatrick, both of Toronto, G.G. MacLennan of Owen Sound, Ont., D.H. Masson of Ottawa, Q.S. Shirriff of Toronto, and H.D.M. Wallace of Blind River, Ont.

† Stedman came to Canada after the First World War and joined the Canadian Air Force in 1922. In 1924 he became Assistant Director, Supply and Research, RCAF. He rose to become Director-General Air Research as an Air Vice-Marshal in 1942.