London's Air Defense During the First World War: The Scene from the Ground

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For Mom & Dad

Introduction

As a result of the first flight across the English Channel in 1909, England faced a new threat to its national security. Despite this early warning she was quite unprepared to face the challenge presented by the German air services during the First World War. England's air defense consisted of anti-aircraft guns on the ground and planes in the skies. Both of these methods of air defense, however, were lacking in quantity and quality during the early years of the war.

This thesis will trace the evolution of England's air defense on the ground from the prewar years to the war's conclusion in 1918. The British government and military experienced ridicule and many failures as they tried to defend properly their kingdom. Early in the war the ground forces lacked guns, ammunition, searchlights and men. It would take years for the British to accumulate enough weapons and searchlights to defend properly their cities and factories.

The opening chapter will show that the British realized the threat posed by German airships before the war, but as hostilities began they were woefully unprepared. Anti-aircraft guns were the main defense for England's factories, docks and magazines because all the useful planes had been sent to the front. Admiral Sir Percy Scott took over London's air defense in September 1915 and increased London's gun protection with aid from the French. The capital's defense began to move forward, but slowly.

Chapter two deals with how London's defense gained the upperhand against the Zeppelins in 1916. This section begins with London's air defense being transferred from the Admiralty to the War Office. Despite experiencing German airship raids that

increased in number and severity, the Home Defence continued to improve and England's citizens remained steadfast. Britain's Home Defence gained the advantage over the airships by equipping its planes with incendiary bullets which could ignite the gas within the dirigible and send it to earth in flames.

Chapter three covers 1917-1918. In 1917 the Germans started to use bomber planes to attack English targets. The English had greatly increased their gun production by 1917 but learned that numbers were only part of the solution. Many aircraft were still getting through despite greater gun and aircraft protection. The rest of the answer lay in establishing better communication between the ground forces and the planes overhead. To remedy this problem Major-General Ashmore created the London Air Defence Area (L. A. D. A.) to try and mesh the ground and air aspects to create a better defense. The guns, lights and schemes of the ground crews continued to play a pivotal role in Britain's air defense through the end of the war.

Most of the books written about the air raids on England during the First World War such as The Sky On Fire by Raymond H. Fredette, War on Great Cities by Frank Morison and Zeppelins Against London by Kenneth Poolman, focus more on the individual raids themselves and the damage inflicted by the enemy. While the ground defenses are discussed, the planes receive the majority of the attention. This paper will do the opposite by looking mainly at the ground defenses, their problems and how they evolved as an important aspect of London's defense.

The British Cabinet Papers, Parliamentary Debates and documents edited by S. W. Roskill hold many discussions between various ministers, members of Parliament, military leaders and Prime Ministers on the air defense question. The books written by men such as E. B. Ashmore, Sir Percy Scott and Alfred Rawlinson, who served in various capacities of air defense, provide their views and recollections on problems, solutions and techniques of the ground defense. The impressions the British air defense made on the German pilots and crews raiding England are provided in articles written by these men and a collection of post-war interviews provided in Rolf Marben's book Zeppelin Adventures. British pilots, who formed the other arm of the air defense, had their own insights and opinions on the ground defense. Letters and memoirs of British pilots Rothesay Stuart Wortley and Cecil Lewis provide this information. Prime Minister's Herbert H. Asquith and David Lloyd George's memoirs, in addition to Winston Churchill's, add another facet to the study of the air defense problem. The views of the citizenry, whose outrage was key in pushing the government to action, can be found in the letters to the editor in the Times (London), letters of F. O. Oliver, the writings of journalist Michael MacDonagh and the records of London's religious leaders in the Records of the Raids, edited by the Bishop of Stepney.

A Precarious Beginning

CHAPTER ONE

In the predawn hours of 25 July 1909, French aviator Louis Bleriot prepared his aircraft for an attempt to be the first person to traverse the English Channel. Accomplishing this feat would earn him world renown and the £1,000 prize offered by the English newspaper, the Daily Mail. For five days inclement weather hampered Bleriot and his rivals' attempts to cross the Channel. By midnight the weather became favorable and within four hours Bleriot took his plane, named Bleriot XI, for a brief test flight over the French town of Baraques, near Calais. Confident with his aircraft's performance, the pilot started across the Channel.[1]

Upon the Channel were several French warships from which Bleriot was to acquire his bearings. The plane traveled 250 feet above the ocean, approximately forty-three mph and quickly surpassed the warships below. Ten minutes after departing, Bleriot turned his head to look back and get his bearings and was stunned. Bleriot recounted for the Times (London), "I am amazed. There is nothing to be seen, neither the torpedo-destroyer, nor France, nor England. I am alone."[2] The Frenchman was lost. He let the plane continue on its course, not letting the machine waver. Without a compass, Bleriot soon saw the English coast. He landed Bleriot XI in Dover, further west than he had intended, and damaged his plane in the process. Bleriot became a hero to England and France. With a badly burned foot from an earlier aviation accident, he stepped gingerly from his plane into a world of medals, banquets, speeches and acclaim. One gala dinner even provided for guests a nougat replica of Bleriot XI.[3]

[1]"Cross-Channel Flight," Times (London), 26 July 1910, p. 8, col. 1.

[2]Ibid., col. 2.

[3]"M. Bleriot's Flight," Times (London), 28 July 1909, p. 6, col. 3.

The flight was more than a bold, history making feat. A man had flown a machine across the English Channel in approximately thirty-five minutes. This method of travel allowed men to fly over immense armies, geographical barriers, and according to an eyewitness to the flight, "It [the plane] was judged to be flying at a height of about 300 feet as it came over the naval harbor, passing above the battleships of the Atlantic Fleet."[4] This development obviously posed a threat to Great Britain's national defense. The waters surrounding Britain, coupled with the Royal Navy, were the island nation's armor. As historian Robert K. Massie wrote, "And so the metaphor: the navy, the shield; the army, the spear."[5] But following the rapid advancement of aviation and Bleriot's famous flight, a gash in the armor appeared. Concerning later wartime attacks by Zeppelins against England, one German historian wrote, "The incredible had become reality; the island of Great Britain was brought near to us. The air over the North Sea waters that divided the island from the main land had become a nightly bridge, and the whir of the propellers of gigantic specters spread terror over Old England."[6]

Britain made some effort in the pre-war years to bolster its home defenses, but by the outbreak of the Great War in August 1914, she remained quite unprepared. In the autumn of 1915, First Lord of the Admiralty Arthur Balfour placed Admiral Percy Scott

[4]"Cross-Channel Flight," p. 8, col. 3.

[5]Robert K. Massie, Dreadnought: Britain, Germany and the Coming of the Great War (New York: Ballantine Books, 1992), 626.

[6]Rolf Marben, Claud W. Sykes trans., Zeppelin Adventures (London: John Hamilton, Ltd, 1931),17.

in charge of London's gunnery defense and compelled the authorities to take action.[7] Despite Britain's lack of air defense early in the war and the myriad of problems created by the novel type of warfare, she produced a respectable defense against German air aggression. The role played by the ground defense--its various guns, searchlights and defense schemes--greatly enhanced the defense of London.

Evidence that the threat of air attack troubled the British can be found as early as 1909. Before the cross channel flight, the Committee of Imperial Defense (C. I. D.) met on 28 January 1909 to discuss aerial matters. Great Britain dismissed the possibility of being invaded outright by airships but discussed the damage that could be inflicted by an airship intent on dropping explosives on British targets. Docks, factories, arsenals, dams and ships were the targets most mentioned by the committees which dealt with matters of air defense. The C. I. D. also realized that their defenses against such a strike were lacking. The report read "it is doubtful whether our men-of-war and coast defences at present possess adequate means to ward them off."[8]

Aware of possible if not probable air attack during time of war, the Home Ports Defence Committee (H. P. D. C.) next had to decide the best method of defense for strategic sites. The War Office suggested to the H. P. D. C. that mobile and fixed guns were the best options at that time. British aircraft could be stripped of their guns and have them mounted on chassis for mobile defense. The second option required fixed gun

[7]Admiral Sir Percy Scott, Fifty Years in the Royal Navy (New York: George H. Doran Company, 1919), 288.

[8]Cab. 38/16/10, "Note by the Secretary," 28 January 1909.

emplacements being positioned on or near factories vital to war production.[9]

When considering the most likely form of air attack, the H. P. D. C. correctly assumed that the enemy would use the more reliable dirigible over the still developing airplane. The March 1910 report read, "Aeroplanes have at present a small carrying capacity and range of action, and can only travel at great speed . . . as regards dirigible airships; there has been great activity both in Germany and France, and from what is known regarding the progress made in these countries, it appears that at the present time, with wind and weather favorable, attacks by dirigible air-ships against our magazines or stores should be regarded as possible operations of war."[10] Zeppelins carried out the raids on England during the first years of the war and only later were serious raids attempted by the German Gotha bomber plane, with the first such attack against London occurring on 13 June 1917.[11] The H. P. D. C. memorandum reiterated the fact "that measures should be taken to safeguard ourselves against attacks by air-ships."[12]

Innovations in all areas of aviation resulted in a European Conference in May 1910 which convened in Paris, France. The Paris Conference as it was known had representatives from nearly all European countries. The British sent a delegation headed

[9]Cab. 38/16/10, "The Defence of Magazines, Cordite Factories and Other Vulnerable Points Against Air-Ship Attack," March 1910.

[10]Ibid.

[11]Raymond H. Fredette, The Sky on Fire: The First Battle of Britain 1917-18 and the Birth of the Royal Air Force (Washington, D.C. : Smithsonian Institution Press, 1991), 263.

[12]Cab. 38/16/10, "The Defence of Magazines, Cordite Factories, and Other Points Against Air-Ship Attack," March 1910.

by Rear-Admiral Sir Douglass Gamble. This delegation believed they would be discussing, "such subjects as papers of identity for aeronauts, permits, identification marks for aircraft, international certificates of proficiency, police and customs precautions, and those 'rules of the air' civilized nations might agree upon in the novel circumstances of the day."[13] But the conference proved to be an early sign of friction between the Germans and British when the Germans began mentioning strategic and military questions that the British did not expect. Dr. Johannes Kriege led the German delegation and Louis Renault headed the French. Both delegates believed that the skies were essentially free to all. "Both advocated that navigation above foreign countries should be declared free in principle, but that the state should be permitted to disregard this principle in the interests of national defense or of the security of its inhabitants or its property. To this the German delegation added a further clause stipulating that foreign air-ships should not be treated less favorably than those of nationals."[14] The British delegation realized the importance of the requests and decided on 25 June 1910 to adjourn the Paris Conference until 29 November 1910. The British delegates were also alarmed by the manner in which the Germans were behaving over the clauses. A British general staff memorandum, dated 11 July 1910, stated, "With greater knowledge than we possess at present, it may be possible perhaps in the future to grant further concessions to aeronauts, but it would not in the opinion of the general staff be prudent, at any rate for

[13]Alfred Gollin, The Impact of Air Power on the British People and their Government, 1909-14 (Stanford, California: Stanford University Press, 1989), 134.

[14]Ibid.,137.

some time to come, to accept the views which have been pressed with so much suspicious insistence by the German delegates."[15]

The British feared that if the Germans had freedom of the skies over their European neighbors, they could easily use them as havens for supply and repair of German airships. This development would be detrimental to Great Britain in time of war. Also, if a country could freely navigate its airships over sensitive military and industrial areas, it could devise plans of attack against such targets. The British were even concerned about meteorological information, the general staff believing that German freedom over British skies would permit them to "study localities as well as the fogs and air currents around our coasts permit."[16]

Strategists in prewar Britain were also aware of the need to accelerate their own aerial program. The Royal Navy strove to keep its numbers equal to the next two naval powers combined. The C. I. D. thought that it should attempt to do the same with aircraft. "Applying the sea analogy to the air . . . we shall in such circumstances have to rely on acquiring and maintaining, if not air command, at least air equality, by constructing air-ships capable of destroying those air-ships, if in time of war they threaten our sea war-ships, or approach our shores."[17] Positive and negative aspects for dirigibles and airplanes already existed. The dirigible flew longer distances and for a longer period

[15]Cab. 38/19/60, "Proceedings of the Committee of Imperial Defence with Reference to the International Conference on Aerial Navigation 1910," December 1910.

[16]Ibid.

[17]Ibid.

of time than a plane. The airship could also receive and transmit wireless messages over long distances.[18] A lighter-than-air dirigible could sustain considerable damage and remain aloft. At a 1909 field test in Germany, a fifty feet long dirigible at a distance of 1,250 meters had 4,800 rifle rounds and 2,700 rounds by maxim machine guns fired at it. The balloon remained aloft. When retrieved, the balloon had been struck in seventy-six places.[19]

Some of the problems concerning airships were that they were cumbersome and expensive. In 1910 an airship might cost £40,000 to build; a single plane could be built for only £1,000.[20] The airplane also had the advantage in speed over the bulky aerostat. General Brun, the Minister of War in 1910, believed that the speed of the airplane should be the deciding factor when choosing the type of machine.[21]

At a June 1910 C. I. D. meeting concerning the adjourned Paris Conference, the committee wanted nothing to do with agreements that would infringe upon Britain's security, or as Winston Churchill stated, "retaining our freedom of action regarding the right to make such regulations as we thought fit, or at the very least of reserving areas to be excluded from the restrictions of the Convention."[22]

[18]Cab. 38/20/1, "Report of the Technical Sub-Committee," 29 February 1912.

[19]Ian V. Hogg, Anti-Aircraft: A History of Air Defence (London: MacDonald and Jane's, 1978), 17.

[20]Cab. 38/16/18, "Extracts from an Article by the Military Correspondent of the 'Times'," 3 October 1910.

[21]Ibid.

[22]Cab 38/19/60, "Proceedings of the Committee of Imperial Defence with Reference to the International Conference on Aerial Navigation 1910," 22 June 1910.

But if they refused the suggestions, made in insistent tones, a question of the other nation's reactions arose. The Committee believed three possible reactions might occur:

1. We should be criticized as retrograde, insular, and suspicious.

2. We should expose ourselves to reprisals; and the landing and navigation of British air-ships in foreign territory might be restricted.

3. Our sensitiveness with regard to the free development of aviation might lead to increased efforts on the part of other powers to develop the use of air-ships for war purposes.[23]

Winston Churchill believed, in light of what would otherwise be lost, these scenarios were quite acceptable.[24]

On 29 November 1910, the British postponed the Paris Conference indefinitely. The Great Powers were aware that, as aviation advanced, it would play an important role in warfare, and Britain knew what a threat German airships were to its army and navy.

On 13 June 1913, the first Annual Report of the Air Committee on the progress of the Royal Flying Corps addressed the need for anti-aircraft guns. The following chart lists the number and type of guns being produced for air defense:

[23]Ibid.

[24]Ibid.

Number of Guns	Guns
1	4-in. Q.F. (Lent by Navy)
1	12-pr. Q.F.
4	3-in. Q.F.
1	1-pr. Q.F.
20	37-millim. Pompoms
1	18-pr. Field gun

SOURCE: Data from Cab. 38/24/21, "The Royal Flying Corps: First Annual Report by the Air Committee," 7 June 1913.

Some guns were already fixed on or near important sites in England, and the twenty-eight guns shown in the progress report show an uneasy Britain making an effort to produce more guns for air defense. Still it must be remembered that the guns listed above were ludicrous, if one considered that the city of London alone measured 700 square miles.[25]

For some of the guns the report provided the maximum height which the weapons could reach. For example, the four-inch gun could fire a shell to a height of 4,500 feet.[26]

[25]Alfred Rawlinson, The Defence of London, 1915-1918 (London and New York: Andrew Melrose (Ltd.), 1923), 261.

[26]Cab. 38/24/21, "The Royal Flying Corps: First Annual Report by the Air Committee," 7 June 1913.

Yet in a C.I.D. meeting in February 1913, Prime Minister Herbert Asquith inquired about the maximum height attainable for a Zeppelin. The answer given him was 6,000 feet.[27] In this instance the only chance to strike an enemy airship was if it descended to a range accommodating to the gun crew.

The report also provided the lackluster results of a three-inch gun tested at Shoeburyness. The most that could be said for the gun's performance was that it provided "fairly promising results."[28] As far as the pompom guns were concerned, Sir Percy Scott wrote that those guns "would not fire up as high as a Zeppelin, and were consequently only a danger to the population."[29]

In May 1914, the Air Committee issued the Second Annual Report on the Progress of the Royal Flying Corps. The committee devoted much of their report to progress in armament against air attack for planes, ships and important land positions. Some of the guns and ammunition provided for the naval ships were siphoned from land units. The report read, "12 old type guns taken over from land service are available for 6 of the torpedo-boat destroyers . . . 200,000 rounds have been taken over from the land service."[30] This was a problem for both the land and sea services. Both had to contend with the other for anti-aircraft guns because they both used many of the same weapons

[27]Cab. 38/23/9, "Extracts of Minutes from 122nd Annual Meeting of CID," 6 February 1913.

[28]Cab. 38/24/21, "The Royal Flying Corps: First Annual Report by the Air Committee," 7 June 1913.

[29]Sir Percy Scott, 289.

[30]Cab. 38/27/22, "The Royal Flying Corps. Second Annual Report," 9 May 1914.

and searchlights. Only the mountings had to be changed. Approximately thirty more guns were provided for dockyards and arsenals throughout England.[31]

Since the previous year many interesting experiments were tried in connection with air defense. Magazines were built underground and some above ground magazines had wire netting placed over them to see if bombs would bounce off of the protective net without striking the magazine. An experiment with a one hundred pound dummy bomb succeeded.[32]

By 4 August 1914 Great Britain was at war. Germany's threat of air attack already played upon the minds of the London authorities. Protective netting and sand bags were erected to protect Buckingham Palace.[33] On 10 September 1914, London's lights were dimmed on order of the Commissioner of the Metropolitan Police. Houses, street lamps and trains all had to have shades or blinds to help darken the city.[34]

Michael MacDonagh, a journalist for the Times (London), who often wrote about the London raids in his diary, described the darkening of the capital. "As I was going home from the Houses of Parliament last night I could not read my evening paper, so dim

[31]Ibid.

[32]Ibid.

[33]Raymond Laurence Rimmell, Zeppelin! A Battle For Air Supremacy in World War I (London: Conway Maritime Press, 1984), 57.

[34]Michael MacDonagh, In London During the Great War: The Diary of a Journalist (London: Eyre and Spottiswoode, 1935), 22.

was the lighting of the Clapham train."[35] MacDonagh also recounted a conversation between two workmen on the train, which displayed England's apprehension and determination concerning possible attack. "They could never get here," said one. "I hope they will come," said the other. "We'll stick pins in their bloody gas-bags."[36]

F. S. Oliver, who enjoyed the raids, wrote a letter to his brother W. E. Oliver describing one raid in September 1915 as "a very beautiful sight. Regarded merely as a fireworks display, it is much the finest thing I have ever seen in my life, but the death toll was pretty heavy and the destruction of property considerable."[37] He believed the authorities wise to plunge London into darkness but admitted it provided a peculiar spectacle. He wrote in the Autumn of 1914, "the result is that London is a very curious sight after dark . . . as one looks out of one's bedroom window at midnight on going to bed, one sees no lights at all where one used to see a great blaze."[38]

The Royal Flying Corps began the war by sending its best planes to fight with the British expeditionary force, leaving England with inferior planes provided by the Naval air wing.[39] Hence, guns provided much of England's defense during the early phases of

[35]Ibid.

[36]Ibid.

[37]Stephen Gwynn (ed.), The Anvil of War: Letters Between F. S. Oliver and His Brother, 1914-18 (London: MacMillan and Co., Limited, 1936), 115-16.

[38]Ibid., 43.

[39]Hogg, 30.

the war, and were quickly found to be woefully inadequate. Winston Churchill, First Lord of the Admiralty, believed offensive strikes at Zeppelin sheds constituted the best defense against foreign airships.[40] The opening phase of the war thus witnessed numerous daring and successful raids on sheds in Germany, with British pilots flying from bases in unoccupied Belgium.

One example of this anti-Zeppelin tactic occurred on 10 October 1914, when Squadron Commander Spenser Grey and Flight Lieutenant R. G. L. Marix flew from Antwerp, Belgium, and attempted to bomb Zeppelin sheds in Dusseldorf and Cologne. Marix dove to within 600 feet of a shed in Dusseldorf and released his bombs. Squadron Commander Grey wrote of the result in his report to the Admiralty, "The roof fell in within thirty seconds and flames 500 feet high were observed, indicating that an inflated Zeppelin must have been inside."[41] Grey, unable to locate a shed in Cologne, bombed a nearby railroad station. Ground fire damaged Marix's aircraft and it ran out of fuel which forced him to land. He acquired a peasant's bicycle and pedaled the remaining distance to Antwerp.[42]

The significance of one airship being destroyed should not be overlooked. The air raids on England during the First World War could never compare to the Second World

[40]Malcom Cooper, The Birth of Independent Air Power: British Air Policy in the First World War (London: Allen and Unwin, 1986), 15.

[41]S.W. Roskill (ed.), Documents Relating to the Naval Air Service Vol. I 1908-1918 (London: Navy Records Society, 1969), 180.

[42]Ibid., 180-81.

War's terror bombing or the carnage on the various fronts from 1914 to 1918. However, a single dirigible could inflict heavy casualties and damage. One Zeppelin bombed Yorkshire and Hull on 6 June 1915. Because of the bombing twenty-four people died and forty were wounded. Damage was so severe in defenseless Hull that rioting erupted. On 15 June another single Zeppelin killed eighteen and wounded seventy-two in Northumberland, Durham and Jarrow. Another raid on 1 April 1916 against Northumberland, Yorkshire and Durham, killed 22 and injured 130.[43]

The Admiralty was in charge of AA defense in England and assigned various duties related to air defense to a volunteer force called the Royal Naval Volunteer Reserve (R. N. V. R.). During the next two years mobile and fixed gun units would be established in other cities and areas of England.[44]

Although the dreaded air raids anticipated did not materialize in 1914, London's AA defense was already fraught with difficulties. To begin, members of the R. N. V. R. were often professional men, volunteering only a small portion of their time. They were originally asked to devote four hours time to the defense effort. The Admiralty, however, required six and men often had to work extra hours for those who did not report to duty. Many quit the R. N. V. R., unable to juggle their personal business with the defense of London.[45]

[43]E. B. Ashmore, Air Defence (London: Longmans, Green and Co., 1929), 157-59.

[44]Roskill, 168-69.

[45]Ibid., 170.

With proper drilling, gun crews became efficient, only to be scrapped and taken over by proper military authorities. The former crew could then be dispersed to another station, with different methods, and forced to start anew. Gun crews also used their allotment of shells and did not receive new ones for weeks. Shells were often poorly supervised and were left to spoil in the elements. Many volunteers were forbidden to even touch the gun they were expected to fire during an air raid. In addition, training often took place with outdated guns.[46]

In early September 1914, special buildings such as the Admiralty Arch, Foreign Office and Crown Agents' Office in London were provided a one-pdr. pompom gun. The Third Sea Lord, Rear Admiral F. C. T. Tudor, devised a plan for London's defense. The plan read, "The independent defence of isolated buildings or localities against aerial attack would be practically useless. It was, therefore, considered preferable to treat the portion of London extending from Buckingham Palace to Charing Cross bridge as being the most vital portion, and to arrange for the scheme of defence with this as a centre."[47] The roof of Charing Cross station, Lambeth Bridge and Hyde Park Corner shared the three pairs of searchlights apportioned for this "vital area." Many airfields were to surround the same area but at a distance of ten miles,[48] the hope being that the British planes could bring down the raiders before they could reach the capital. Early in the war,

[46]Ibid., 170-71.

[47]Ibid., 172-73.

[48]Ibid., 173.

this rarely succeeded.

The British also flew one of their own airships, named "Eta," over London to acquire information concerning what the Germans would see while flying over the city and to give their searchlight and AA crews vital practice in locating and targeting airships. The practice flights occurred at different times of the day and night and in different weather conditions to see the differences when observing London.[49]

Winston Churchill wrote a memorandum concerning air defense on 22 October 1914. In this document Churchill compared the guns provided for air defense at the beginning of the war and the guns provided by the time of the memorandum. Churchill produced evidence that England lacked guns and that most were useless Pom-poms. As the war began, "the only provision which had been made for home defence against aerial attack was limited to the mounting of 33 guns as follows: one 4-inch, four 3-inch, twenty-eight 1-pr. Pom-poms. The Pom-pom guns are of very small value. Those that have been tried in the field have been found unsatisfactory. No shrapnel is available for them, and the shells provided do not burst on the fabric of a Zeppelin, and almost always fall back to earth as solid projectiles."[50]

By the time of this memorandum, it was the Navy's turn to relinquish some guns to the Home Defence. The navy provided nine three-inch, forty-three six-pr. and four three-pr. guns for England's defense and many more were being built or mounted.

[49]Ibid., 178.

[50]Ibid, 182.

Churchill also stated that residential areas could not be protected. All of the available guns would be used for safe guarding military targets "and those only in a very partial and limited degree."[51]

The Royal Flying Corps continued to attack Zeppelin sheds on the continent. As with the Zeppelin attacks later in the war, bombing from the fragile airplanes available in 1914 was a dangerous business. Prime Minister Asquith recalled a comment by First Sea Lord Churchill, "Winston grimly says a lot of them will never be able to use the second half of their return tickets."[52]

The Times (London), reported a successful raid by British planes over Zeppelin factories located in Friedreichshaffen on Lake Constance on 21 November 1914. Wortley Stuart Rothesay, an officer in the Royal Flying Corps, said the purpose behind such attacks was, "to singe the whiskers of Count Zeppelin or the mustachios of his Imperial Masters before the latter could bring their aerial Armada into action."[53]

Four planes planned to attack the factory but one had mechanical problems and did not partake in the operation. The remaining three planes destroyed a hydrogen factory and a Zeppelin.[54] However, the German AA fire made a good showing, bringing down one of the three raiders. Officer Wortley recorded, "both the returning pilots

[51]Ibid.

[52]H.H. Asquith, Letters to Venetia Stanley (Oxford: Oxford University Press, 1982), 285.

[53]Rothesay Stuart Wortley, Letters from a Flying Officer (Gloucester: Alan Sutton, 1982), 38.

[54]Asquith, 319.

reported that they were met with a heavy fire from guns and mitrailleuses. Briggs was forced to land, while both Sippe and Babington were badly shot about."[55] Considerable time would elapse before British AA fire would be worthy of such praise.

The first raids on England, really very minor incidents, occurred late in December 1914 and were carried out by planes rather than Zeppelins. On 21 December, a solitary plane flew near Dover Harbor and dropped two bombs into the sea. On Christmas day another plane followed the Thames as far as Erith and turned towards home. Michael MacDonagh remembered the occasion: "What a surprise it would have been were we interrupted at our Christmas dinners by the destructive roar of German bombs. So we remarked to each other today, and laughed at the idea."[56] The "raid" would have been less comic to MacDonagh and his colleagues had they known that the day's events were a portent of England's inadequate and inept air defense. When six planes arose to challenge the attacker, the AA gunners directed fire at their own planes.[57] This was a common problem throughout the war.

On New Year's Eve Michael MacDonagh bid a bitter farewell to 1914 and embraced 1915 with the hope that the War would end quickly. He wrote, "The Old Year has written 'finis' on its black and hateful record. The New Year has come with a white

[55]Wortley, 40.

[56]MacDonagh, 46.

[57]Ashmore, 165.

virgin sheet. What will destiny write upon it?"[58] Unfortunately, MacDonagh would have prelude to what was to begin in earnest during 1915.

The First Lord of the Admiralty Winston Churchill was keenly aware of the impending raids by Germany's airships and England's inability to prevent them. In his war memoirs he wrote, "There is no known means of preventing the airships coming, and not much chance of punishing them on their return. The unavenged destruction of non-combatant life may therefore be very considerable."[59] The possibility of Zeppelin attacks on London were obvious not only to the military authorities but to the citizenry in general. In January 1915, F. O. Oliver wrote to his brother "I should think the Germans will try to make a mess in London, and they may quite well succeed."[60]

In a War Council meeting on 7 January 1915, Churchill explained the composition of London's defenses. The aerial and ground defenses were contained within a triangle, whose points were London, Sheerness and Dover. This triangle had sixty aircraft and some AA guns at its disposal to intercept incoming airships. The makes of the guns were "nine 3-inch, thirty-nine 6-prs., and 28 pompom guns . . . in London itself there are two 3-inch, four 6-pr., and 6 pompoms, with 13 searchlights."[61]

The information Churchill provided shows that England continued to bolster its air defense, but the numbers were inadequate and Churchill knew it. He quickly pointed

[58]MacDonagh, 48.

[59]Winston Churchill, The World Crisis Vol. 1 (New York: Charles Scribner's Sons, 1923), 51.

[60]Gwynn, 190.

[61]Cab 42/1/11, "Secretary's Notes of a Meeting of a War Council," 7 January 1915.

out that nothing could prevent the raiders from inflicting heavy damage and casualties upon the population. Aware that the Admiralty would be blamed, he covered himself.

The inevitable first Zeppelin attack took place 19 January 1915 on the Norfolk coast. Zeppelins L3 and L4 (Luftschiff 3 and 4) dropped their bombs on a foggy day in England killing four civilians and injuring seventeen. No planes rose to defend the skies and no AA guns fired on the raiders.[62]

A "spy scare" occurred briefly following the initial Zeppelin raid in which rumors abounded that the enemy airships were being aided by signals from motor cars and other lights on the coast. An amused Herbert Asquith wrote to Venetia Stanley on 27 January 1915, "Somewhere in Norfolk a vigilant officer discovered suspicious signaling lights going on from the top of a Church tower. He assembled his men who felt their way in the darkness with fixed bayonets to the Churchyard, and were just about to fire, when they discovered that the suspected spies on the steeple were their own comrades from another company who had seized the opportunity to do a little signaling practice."[63]

The question of elements sympathetic to the Germans signaling from English soil would not abate, especially in the House of Commons. One member of Parliament asked if aliens living on the coast had been removed. He was informed that the orders for such an operation had not been given.[64]

[62]Ashmore, 156.

[63]Asquith, 379.

[64]Parliamentary Debates (Commons), 5th ser. , vol. 69, (1915), col. 403.

Concerning the 19 January 1915 raid, MP Fell asked "why the Zeppelin airships which traversed Norfolk recently were not fired at by the numerous forces stationed there . . . and if the same immunity is to be afforded them on their next attack?"[65] The answer was the often heard "It is obviously undesirable to make any detailed statement in answer to this question."[66]

A long lull followed the 19 January attack, the next coming on 14 April 1915, against Tyne. The defense remained meager. Two planes went up to engage the enemy but failed. The ground response consisted of rifle fire from a cycling battalion; fortunately only two civilians were injured.[67]

However, during the spring and summer months of 1915, the Zeppelin attacks continued, and the death toll mounted. From the first raid on 19 January 1915 to 8 September 1915, 136 people had been killed and 396 wounded by Zeppelin raids in England.[68] The climbing death toll increased the paranoia and tension among both citizens and officials. Lord Charles Beresford, the former commander-in-chief of the Channel fleet, reflects the extreme mood of some of the upper echelon military leaders. Beresford believed "that if ever Zeppelins drop incendiary bombs on London many of those Germans among us would set fire to the city in twenty or thirty different places . . .

[65]Ibid., col. 718.

[66]Ibid.

[67]Ashmore, 156.

[68]Ibid., 156-58.

I would put them all behind barbed wire."[69]

First Sea Lord Jackie Fisher believed that the German population residing in Britain should all be held hostage and advised the German government that a German would be killed for every English civilian lost in German Zeppelin raids. When Fisher did not get his way, he threatened resignation. Winston Churchill wrote to Fisher, "I sympathize with your feelings of exasperation at our powerlessness to resist certain forms of attack; and I presume I may take your letter simply as an expression of those feelings."[70] The two men continued their work and did not mention the problem again.

The increasing air attacks on England continued to prove that, despite some effort on the part of the British military, England still lacked even an acceptable form of air defense. Zeppelins after attacking fled unscathed. The Germans hoped to create widespread panic among a horror-stricken population. Instead, the British people became angry for the lack of protection given them. On 20 June 1915 Alfred Rawlinson became lieutenant-commander of the R. N. V. R. . He wrote of the people's mood which prompted action from the government:

> There was, of course, no sign whatever of any kind of panic, but there undoubtedly was a certain feeling of dismay. This was immediately followed by a deep and universal anger that such attacks should be upon our defenceless women and children. Above all arose a still deeper feeling of dissatisfaction when it was realized that no adequate system of defense existed, and that our homes lay at the mercy of the enemy, of whose murderous intentions no doubt remained.[71]

[69]MacDonagh, 62.

[70]Churchill, vol. 2, 52-3.

[71]Rawlinson, 5.

The government, fearing riot or insurrection on the home front, knew that something had to be done to expedite the efforts to increase the air defense of the realm and allay the fears of their worried population.

On the nights of 7 and 8 September, two severe Zeppelin raids occurred, leading to demonstrations in London. During the two attacks 44 people were killed and 132 wounded. The notorious Zeppelin commander Heinrich Mathy inflicted £510,000 in damage on London with his Zeppelin alone.[72] Public demonstrations spurred the government to action "which under other circumstances it would probably have taken still many months to initiate," wrote Rawlinson.[73]

Increased quantities of guns on the ground did not automatically lead to countless Zeppelins spiraling to earth in flames. The accuracy of the gun crews, for many reasons, proved atrocious. Lack of practice, poor sights and range finding equipment and weather conditions all contributed to poor performance. In a letter to his brother, F. O. Oliver described the inadequate AA fire during the recent September raids: "I saw quite close at hand one of our visitors. A long thing like a burnished copper cigar. It was probably traveling quite fast, but it appeared to be behaving with stately dignity. The sky at this side was quite full of shrapnel exploding everywhere except in the vicinity of the Zeppelin."[74]

[72]Ashmore, 158.

[73]Rawlinson, 9.

[74]Gwynn, 115.

By 11 September the First Sea Lord of the Admiralty, now Arthur Balfour, temporarily turned London's gun defense command over to Admiral Sir Percy Scott, an experienced inventor of gunnery equipment. The Admiralty brought Scott out of retirement because of his expertise in gunnery matters. The Times (London) wrote that Scott would "give greater confidence to the public."[75] Lord Balfour was candid with the Admiral, telling him the defenses at present were inadequate and that London's gunnery authority would soon be turned over to the War Office. Sir Percy Scott wrote of the debacle, "To cheer me up they informed me that they could not give me any more guns at once, and that, although they had been experimenting for ten years they had no time-fuzes suitable for exploding high explosive shell, the only guns they had mounted on mobile mountings were Maxims, which were of no use against Zeppelins; they had no airmen who could fly at night, and if they had had them they would have been no use, as there was no ammunition suitable for attacking Zeppelins."[76]

Scott's comments give evidence of both his straight forward style and just some of the serious problems facing his air defense. Too few guns existed to defend the sprawling metropolis and those available were ill equipped. The problems of airplanes and lighted airfields were not Admiral Scott's, but were the responsibility of the head of the Air Department headed by Admiral Vaughan Lee.

[75]"Air Defence of London," Times (London), 14 September 1915, p. 8, col. 3.

[76]Scott, 291-92.

Lord Balfour admitted that no new guns were immediately forthcoming for London's gunnery defense. After accepting the command, Admiral Scott evaluated the guns available in London and found them pitifully insufficient. He wrote that the available weapons were "eight 3-inch high-angle guns, four 6-pounders, with bad gun sights, and six pom-poms and some Maxims, which would not fire up as high as a Zeppelin and were consequently only a danger to the population."[77] Therefore, Scott had only twelve guns, of which only eight had even a chance of striking an airship. Not only were the number and quality of guns insufficient, but the fact that this was over a year into the war made it even more pitiful. In contrast, the head of the defense of Paris, General Gallieni, had 215 guns for 49 square miles of Paris.[78] One of Scott's priorities then was to acquire more guns for the English capital.

Aware that the enemy would quickly learn the location of the fixed gun emplacements, the British attempted to acquire one of the vaunted French 75 mm. guns and mount it to a chassis, making it a mobile artillery piece. Often critical of military and government "red-tapism", as he termed it, Scott was wary of going through the usual Admiralty channels to acquire the piece of artillery with the hope of copying it for British production. In his memoirs he wrote, "I have no doubt that in a few months they would have got the necessary papers through. However, . . . I wanted the gun, not papers, so I ordered Commander Rawlinson, a very fine officer who spoke French like a Frenchman,

[77]Ibid., 289.

[78]Ibid., 291.

to go over to Paris at once and either beg, borrow, or steal a gun."[79]

Commander Rawlinson was a wise choice to acquire a 75 mm. from the French. He had helped them with their gunnery defense of Paris and he knew General Gallieni well. After arriving in the French capital, members of the French army staff repeatedly told Rawlinson he had to go further up the chain of command to be given a gun. Finally, General Pelle, Chief of the General Staff, gave Rawlinson an "auto-canon" and thousands of rounds of ammunition.[80] Instead of months of red tape, Scott and London received a gun within four days of Rawlinson's departure, hardly enough to solve London's gun defense problems but a victory nonetheless. Sir Percy Scott wrote, "Although this was only one gun, its acquisition was very valuable, as it showed us what could be done, and how to do it. The rapidity of the French decision ought to have taught our deliberate Admiralty a lesson but it did not; nothing could put any life into their movements."[81]

The British used the mounted 75 mm. as a model for placing some 3-pr. guns onto a chassis. Soon eight mobile firing guns were ready to aid the defense forces.[82] In addition to the Anti-Aircraft Defence Force, the Royal Naval Anti-Aircraft Mobile Brigades were created from the guns mounted on trucks. Lieutenant-Commander Alfred

[79]Ibid., 293-94.

[80]Rawlinson, 14.

[81]Scott, 295.

[82]Ibid.

Rawlinson trained and led this Mobile Brigade. But despite the mounting of the 3-pr. guns, Rawlinson knew the 75 mm. he drove was "the only one which had any chance whatever of seriously damaging or stopping Zeppelins."[83]

Commander Rawlinson's Mobile Brigade was soon put to the test. The final airship attack of 1915 occurred 13 October. Rawlinson learned by telephone of an impending attack. The mobile units were assembled and sped into action. The vehicles had to contend with poor roads and streets congested with pedestrians, since no form of warning system had yet been established. The gun was taken to a prearranged site on the Artillery Ground located on Moorgate Street, where the enemy was already bearing down on their position, bombs dropping from underneath a Zeppelin.[84]

Rawlinson guessed that the airship was traveling "at a height of from 8,000 to 10,000 feet, and at a speed which I estimated at 50 miles per hour."[85] The crew did not have time to use the weapon's various range-finding instruments and fired on their commander's estimates. The first shell burst fell short. Soon after, the gun crew learned one of the drawbacks of the 75 mm. and of most of the guns of that era. When the airship was directly above the gun, the weapon could not rise high enough to fire at it. The 75 mm. "had entered the 'dead circle' which existed for the French auto-canons, as they

[83]Rawlinson, 22.

[84]Ibid., 21-26.

[85]Ibid., 26.

could not be elevated more than 83 degrees."[86] After the airship emerged form the "dead circle" the gun crew continued to fire but to no avail.

On 13 October 1915, the Globe issued an article critical of the Admiralty's handling of London's air defense measures. The author of the article did not disapprove of Sir Percy Scott being given the post, but believed it was too late to help. The writer also bemoaned the fact that, although the Air Service had been created over five years earlier, it did not have "properly manned guns for the defence of London from air attacks."[87]

The London defenses needed proper guns and ammunition immediately, not months in the future. Sir Scott wrote to Lord Balfour on 18 October 1915, "If I am to remain in charge of the gunnery defence of London I must have a free hand to procure what is wanted how and best I can, and not to be handicapped by Admiralty red-tapism."[88] Arthur Balfour agreed with Admiral Scott. The First Sea Lord's assent led Scott to state that by sparing him Admiralty bureaucracy, Lord Balfour did more for London's defense than anyone. "Without that I could have done little,"[89]wrote the Admiral.

Scott proceeded to piece together more guns for his defense force. He even made a personal visit to the military governor of Paris General Gallieni in France, with the hope

[86]Ibid., 28.

[87]Roskill, 231.

[88]Scott, 297.

[89]Ibid., 299.

of procuring more AA weapons. Scott related to the French general the number of guns in London's possession. The Admiral wrote that the Gallieni "laughed and expressed surprise that the Zeppelins did not come everyday."[90] The general then gave the British 34 additional 75 mm. guns and 20,000 shells. By November the guns available to defend the capital, although of varying degrees of efficiency, numbered 152.

The numbers and types of weapons were as follows:

Number of Guns	Type of Gun
10	4.7 guns
7	4-inch guns
35	French 75mm. Guns
4	4-inch Greek guns
20	15-pounder B.L.G.
12	2.95 Russian guns
34	6-pounder guns
19	3-inch guns
11	3-pounder guns
TOTAL 152	

SOURCE: Data From Admiral Sir Percy Scott, Fifty Years in the Royal Navy (New York: George H. Doran Company, 1919),298.

[90]Ibid., 298

The methods Scott used must have been the envy of men commanding other facets of the R. N. A. S. . Orders for production of airplanes could take months; even the paper work alone could take months. The defense measures in the sky were as woeful as those on the ground.

Joynson-Hicks, MP for Brentford, addressed Parliament about the Air Service on 11 November 1915, speaking of a visit he made one night to a local air station. He was pleased to see a number of machines fueled and fully armed. Pointing at one of the aircraft he inquired, "who is going to fly this machine?" He was told, "If there is a Zeppelin raid the Admiralty will send a pilot down to fly it: there is no one here to fly it." Mr. Joynson-Hicks then asked, "How about the twenty or thirty other machines?" The man to whom he was speaking replied, "This machine will go up and this machine only." Joynson-Hicks told the House that the remarks he then made were unparliamentary.[91]

Joynson-Hicks, the same day, proposed that perhaps London bring some AA gunners from the Western Front, where they had enjoyed success shooting down airplanes at heights of 9,000 feet, to serve and train on Home Defence. He stated to the House that the inexperienced volunteers could not be expected to perform as well trained veterans of the front.[92]

[91]Parliamentary Debates (Commons), 5th ser. , vol. 75 (1915), col. 1358.

[92]Ibid., 1361.

Lord Balfour rose to admit that there were insufficient planes and guns to defend England. But that efforts were underway to increase their numbers. He said, "there are positions on ships and on land where I would like to have guns, simply because the guns are not yet there, though they will be there."[93]

The gun defenses of London were divided between fixed gun and searchlight sites under the supervision of Commander Grenville Grey, and the mobile units were led by Commander Rawlinson. Admiral Scott commanded the entire AA defense and the Admiralty provided fourteen guns of various makes and four automobile mounted searchlights to Rawlinson's brigade.[94]

The voluntary corps serving on the gun crews were a diverse and ever changing group of men. Some were men sent home from the front, perhaps wounded and no longer capable of serving in that capacity. Most were businessmen over the age for serving in the British armed forces. Admiral Scott wrote that they were "University men, barristers, artists, and City men."[95]

On 29 November 1915 the War Committee briefly discussed London's AA defense. Two of the reasons AA guns were slow in coming to London are evident in this meeting. First, the guns and machinery to produce them were complex. It was one thing to cast the mold of a gun, but the difficult and time consuming part was creating proper

[93]Ibid., col. 1384.

[94]Rawlinson, 42-5.

[95]Scott, 299.

mountings for various weapons. Second, the Admiralty and Home Defence had to vie for guns that were acquired or produced, with the naval forces often winning.[96] Merchant ships were often given the four-inch guns the London AA defense desired, since the former had to use them to combat submarines. This type of bickering over guns occurred throughout the war. When more weapons became available, the forces on the front were often given the guns.

Early into the new year, on 16 February 1916, the War Office acquired responsibility for the AA defense of London. Under Sir Percy Scott the AA defense had made considerable strides toward properly defending the capital. Scott stated, however, "Little or nothing having been done, it was very easy to do something."[97] But it was not nearly enough, as there would be many months of Zeppelin attacks. There would also be failure on the part of defense and criticism by the civilian population. Bickering also occurred among the government and armed forces before the London defense could start to play an active role in thwarting the enemy. Yet, by the end 1916, events would lead to the tide turning against the Zeppelins and in Britain's favor.

[96]Cab. 42/5/24, "Secretary's Notes of a Meeting of the War Committee," 29 November 1915.

[97]Scott, 292.

Britain Gains the Advantage

CHAPTER TWO

On 26 January 1916, the War Committee met to discuss the various theaters of war. Among the discussions were the problems of London's air defense and of the localities outside the capital city. Concerning the latter, the defense responsibilities were to be allocated between the army and navy. The naval forces were given the responsibility of dealing with all air threats attempting to reach Britain over the seas. The overland threats were the duty of the army. This had essentially been the makeup of the defense outside London anyway. After discussing the impending transfer of London's defense from the navy to the War Office, the committee discussed the delays in three-inch gun production and the hope that other guns could be converted to AA defense in the interim.[1]

Before and after the transfer of London's air defenses, the navy and War Office bickered over the subject. At the 26 January meeting, First Lord of the Admiralty A. J. Balfour pointed out that the real problem was not the transfer itself but the continued lack of AA guns caused by poor production.[2] As has been noted, placing guns on proper mountings was expensive and time consuming. In addition, London's AA defense held a low priority. When guns and planes were manufactured, the naval forces and the armies on the western front were usually considered first. In most cases, planes and guns were diverted to Home Defence only after a series of severe raids which caused a public outcry or when the other sectors had a rare surplus.

[1]Cab. 42/7/6, "War Committee Subjects of Discussion, and Conclusions," 26 January 1916.

[2]Cab. 42/7/13, "Secretary's Notes of a Meeting of the War Committee," 26 January 1916.

On 9 February 1916, the War Committee discussed air defense matters at length. At the time of the meeting, the committee claimed to have 38 fixed guns, 25 mobile guns, 108 searchlights and 24 planes to defend London. They devised a plan to meet the requirements sufficient to defend the city. The committee proposed that by the end of October 1916 London should have an additional sixty-one fixed guns, fourteen mobile guns and fifty-one searchlights. The remainder of the United Kingdom would be given an additional 282 fixed and 48 mobile guns by late October to supplement the 194 fixed and two mobile guns they had at the time of the February meeting.[3]

General Robertson proposed that even more guns were needed to defend the areas in and out of London. But the Minister of Munitions David Lloyd George stated that these numbers were impossible to achieve. He pointed out that at two of the factories producing three-inch guns, Woolwich and Vickers, production was slow. Lloyd George discussed their manufacturing, saying "the output during January being four guns and 8 mountings. In regards to 4" guns, no mountings would be available for three months."[4] Other problems led to delays in gun and mounting production, one being a direct result of the Zeppelin raids. When raiders were approaching, air raid warnings were given. Munitions and other factories would close for many hours, if not for the rest of the night. Workers, especially those in munitions factories, would quit and go home, fearful of the dreadful consequences of a direct hit on the ordnance stockpiled in the factory. Hence,

[3]Cab. 42/8/4, "Note by the War Office," 9 February 1916.

[4]Cab. 42/8/5, "Minutes of the Sixty-Ninth Meeting of the War Committee," 9 February 1916.

production would be greatly compromised.[5]

The vital arsenal at Woolwich was another point of immense concern to the British. The factory may have been producing three-inch guns too slowly but it played an indispensable role in England's defense. This factory lay within the area of London but was treated as a separate entity. On occasion it was even given higher priority than the capital. The Royal Arsenal, as it was called, contained: many buildings of varying function, millions of pounds of explosives, gunpowder, "live" shells, various chemicals, timber, flammable paints, large cranes, a power plant and coal station, to give some examples of the factory's importance as a munitions producer for the British army.[6]

On 8 February 1916, Vincent L. Raven wrote a letter to Lloyd George explaining the disastrous effects that a direct hit from a Zeppelin would have:

> The effect of a bomb being dropped on any of these magazines or filled shell stores, would be that the explosion would spread from one to the other and cause wholesale destruction of the Filling Factories. It would probably result in bursting the river bank, thus flooding to a depth of about 9 feet the whole of the marshes including the works at Abbey Wood and King's Norton . . . which would be nothing less than a national disaster . . . and practically stop the output there from.[7]

Raven requested that the defense of Woolwich be given top priority and that the guns provided be of the best type available.

Two days before the transfer of London's gun defense, J. P. Du Cane wrote about what he believed the army should do to enhance the AA defense. It seemed to him that

[5]Ibid.

[6]Cab. 42/8/5, "The Defence of Woolwich Against Hostile Aircraft," 8 February 1916.

[7]Ibid.

the Army General Staff believed that increasing the numbers of guns and placing them on fixed positions around various vital sites would be the best method of defense against aerial attack. But he believed that, "mobile guns are of far greater value than fixed guns, and the . . . best defence lies in placing the guns on the most probable lines of approach, so as to deflect the hostile aircraft from its objective"[8] However, Commander Rawlinson's experiences during 1916 would prove Du Cane's theory of coastal defense not entirely true.

On 16 February the War Office assumed control of Britain's air defense. Field-Marshall Lord French took charge of Home Defence while Colonel Simon commanded the guns and searchlights. The same day, debate over the air services erupted in Parliament. Joynson-Hicks railed against the government for still not being able to provide suitable air defense. He called for the navy and army air services to be commanded by one capable man, with a staff recruited from the various branches of defense.[9] Arthur Balfour said government complacency was not to blame for the lack of guns; rather, "it is because of the strain upon the manufacturing resources of the world, which have been inadequate to meet the necessities in material for this War."[10]

Under-Secretary of War Tennant acknowledged the importance of defending areas vital to war production. He spoke in the House of Commons on 14 March: "It is useless,

[8]Cab. 42/8/11, "Minutes of the Seventy-First Meeting of the War Committee," 15 February 1916.

[9]Parliamentary Debates (Commons), 5th ser., vol. 91 (1916), col. 94.

[10]Ibid., vol. 80 (1916), col. 123.

for instance, to increase the strength of your Armies abroad if the bases from which they draw their munitions supplies are laid in ruins by the action of hostile aircraft."[11] However, Tennant did not accept Mr. Joynson-Hick's view that the air defenses were in a deplorable state. The Under Secretary of War stated that Britain now had a gun training school at Shoeburyness and more planes and lighted airfields as well. Mr. Tennant even declared the completion of London's air defense organization. When a House member asked whether the statement meant that Zeppelins would no longer be able to attack London, Tennant replied that the defense organization had been completed, not the defense itself. The following day MP Ashley retorted, "Organization will not protect us against these raids. What we want is the guns, and we want the men ready to protect us from these raids."[12] Ashley also advocated sending more and better mobile guns to the east coast to intercept the air raiders before reaching London.

England also experienced problems with its public air raid warning system. The Home Office did not like the idea of using air raid warnings because numerous false alarms occurred. The town of Hull had experienced twenty-five warnings while actually being bombed only twice. In Ipswich, forty-four air raid warnings had been given, yet it never received any bomb damage. A War Committee document from March 1916 read, "The result of frequent public warnings is to disturb the whole economic life of the town, and retard productive work thus producing the effect at which the Germans aim."[13] The

[11]Ibid., col. 1945.

[12]Ibid., col. 2208.

[13]Cab. 42/11/6, "Note by the Home Secretary," 21 March 1916.

War Office also believed the warnings congested streets and railways in addition to inflicting undue stress on the civilian population. Nonetheless, the warning system in London remained.

The anti-aircraft forces had far to go to reach their potential but were starting to experience some success. On 2 February 1916, L19 attacked England for the first time. Commanding officer Loewe encountered stiff resistance from the English batteries and searchlights below. One witness described the scene as, "Hell's orchestra breaks loose on earth; sirens howl, mortars bellow, cannons thunder. Ghastly red are the flames from their mouths. The L19 is held fast by the searchlights, as though by electric chains."[14] Despite the onslaught, the airship succeeded in dropping its payload. But L19 paid a price for its success. Three of its gas bags were punctured by shell fire and the dirigible rapidly lost gas. The crew's fate was sealed when three of the Zeppelin's four engines stopped running. The L19 made its way over the North Sea but crashed into the dark, icy water.[15] As the freezing crew sat in their sinking airship, an English fishing trawler approached. Commander Loewe requested that his crew be allowed to board the fishing vessel. The captain of the boat, *King Stephen*, refused, fearing his outnumbered crew would be overpowered. The captain of the *King Stephen* promised to alert a patrol boat of L19's position. The next day a boat arrived on the site of the previous day's meeting. But the L19 and her crew had vanished beneath the waves of the North Sea.[16] All sixteen

[14]Marben, 99.

[15]Ibid., 100.

[16]Walter Raleigh, The War in the Air: Being the Story of the Part Played in the Great War by the Royal Air Force 6 vols. (Oxford: The Clarendon Press, 1922), 142.

members of L19 perished after its only attack on London. The airship had become a victim of the guns and searchlights.

On the night of 31 March AA fire brought down a Zeppelin closer to English soil. Commanding officer Joachim Breithaupt steered L15 toward England with his executive officer Lieutenant Kühne. The airship had flown on eight raids and carried a crew of eighteen men.[17] After the war Kühne related the story of the ill fated flight to Rolf Marben. The story attests to Britain's increasingly effective gun and searchlight crews.

The Zeppelin approached a darkened London and was soon fired upon by ground batteries. Finding the gunfire difficult to penetrate from their current approach, the airship swept around from another angle and bombed the city successfully. But over Hyde Park searchlights caught the intruder in their beams. Kühne remembered, "I can tell you that it made me feel devilish queer when those fingers of pale light refused to let go of us. We knew that somewhere down below they were working out our height and speed and that it would only be a matter of a few seconds before the first shells came whizzing round us. We were about 2,500 metres up, and so well within range."[18] The shell fire came, striking the airship, and pieces of shrapnel ripped through several gas bags inside the aerostat.

The usefulness of AA fire quickly became evident. Torn gas bags meant less gas to keep the airship aloft. Commander Breithaupt's ship began to descend; Kühne said:

[17]Douglas H. Robinson, The Zeppelin Combat: A History of the German Naval Airship Division, 1912-1918 (Sun Valley California: John W. Caler, 1971), 386.

[18]Marben, 37.

"gas means life to us . . . we have lost gas and so become heavier. We begin to drop at a fairly rapid pace."[19] The enemy tried to escape the lights and gun fire, but as they steered for the coast the airship continued to fall. The situation worsened when British aircraft began attacking L15 from above. The Zeppelin found itself trapped in a vise comprised of pounding guns below and harassing planes above. "We are the quarry of some infernal huntsman," Kühne exclaimed, "who chases us across the night sky."[20]

The machine gunner on top of L15 fired vigorously at the planes around him and the crew inside threw anything expendable overboard to lighten the wounded airship. This eventually included the machine gun. But these measures were to no avail as the Zeppelin crashed into the waters at Knock Deep. One crew member died and the remaining seventeen were imprisoned.[21]

Including L15, six airships attacked Britain on 31 March. Heinrich Mathy commanding L13 also suffered damage by an artillery shell but managed to return to base. The raiders caused forty-eight deaths and sixty-four casualties during their attack.[22]

The German airship fleet had several advantages over Britain's air defense. The island nation's notoriously damp weather helped the Zeppelins though it was detrimental to the AA crews. Dirigibles had the ability to conceal themselves in clouds. Heinz

[19]Ibid., 38.

[20]Ibid., 39.

[21]Robinson, 385.

[22]Ashmore, 159.

Ellerkamm served on L48 in 1917 and referred to clouds as "friendly cumuli."[23] Clouds and fog served as obstacles for airships, but also provided a haven for airships trying to approach their targets undetected or helped them elude AA fire and planes. Zeppelins were equipped with a cylinder attached to a cable thousands of feet long which could descend from underneath the airship as a spider does from its web. While the Zeppelin hovered in the clouds, this cylinder would be lowered with a man inside. This crewman had a small window, binoculars, a small light and telephone at his disposal. He would use his vantage point to look for certain landmarks to acquire his ship's bearings or help direct the dirigible to safety.[24] The "basket," as it was often called, hung undetectable from the ground.

Commander Rawlinson had no clue that the German airships had this capability until discovering one on the ground following a raid in 1916. He described the surprising and gory find: "This most peculiar and unknown object was a cylinder of sheet aluminium, shaped like a huge cigar, with a fin at one end corresponding to the tail of a fish. Inside this cylinder was found a very nasty mess which shortly before had been a live German."[25]

It appears the airship accidentally released the cylinder when the Zeppelin crew lightened its load. Airship crews commonly threw anything cumbersome overboard that

[23]Marben, 52.

[24]Ibid., 203-4.

[25]Rawlinson, 123.

was not fastened tightly to the ship. By doing this, the crew hoped to make the ship lighter so that it could rise higher more quickly. This was especially true of a ship that had been damaged and losing gas. Men would heave oil drums, fuel tanks, bombs, machine guns, coats or anything else moveable over the side of the ship.[26]

The Zeppelins would usually attack at night, their presence harder to detect against the moonless night sky. If their dirigibles made it to the English coast before nightfall, they would fly along the coast until the skies darkened. To further hide their airships from the ground defenses, the Germans would often paint the underside of their airships black. The commanding officer of the L42, Martin Dietrich, said of his ship, "Black is the hue of the night, and black was the hue we painted our ships."[27]

The night sky, fog and clouds had a worse effect on the gun and searchlight crews on the ground. Even the high powered searchlights could not penetrate the clouds. If the conditions were foggy, the searchlights could often not be used because of the glare the moisture in the air produced. The fog reflected the beam of light back into the eyes of the men working the light. AA crews benefited from clear skies because they could see where their shells exploded in relation to the Zeppelin. The gunners could see if they were firing too short or below the airship and adjust their aim accordingly. Alfred Rawlinson wrote in one post raid report, "Firing was carried out under extremely difficult conditions, it being rarely possible to observe the bursts . . . on account of clouds. It is

[26]Marben, 65.

[27]Ibid., 113.

impossible to state whether any target was hit, for the same reasons."[28] Lieutenant Kühne, who had served on the last flight of L15, stated that for this reason Zeppelin commanders tried to play "hide and seek with the gunners."[29]

The British used a peculiar method to track enemy airships concealed in the night sky and clouds: the ears of blind men. The ground crew fitted each end of a pole with a megaphone facing outward. At the poles' pivot a compass was attached and used to indicate true north. The megaphones were also fitted with a stethoscope which had tubes leading to the pivot at the center of the pole. Then the pole was placed on a man's head and the hollow stethoscope tubes placed in his ears. When the man heard the enemy airship over his head, he would look towards the direction of the sound. The pole would turn with his head and the compass would provide the proper bearings of the enemy which would then be sent via telephone to headquarters.[30] Commander Rawlinson recalled the men best suited for the job: "in the realm of 'hearing' the blind must always reign supreme . . . and men were obtained who, having been born blind, had been entirely dependent on their 'powers of hearing' all their lives."[31] Thus, the blind were employed to aid the AA forces in detecting the "invisible" enemy. The problem with this method occurred when multiple airships were in the vicinity. "Our listening stations were at once

[28]Rawlinson,103.

[29]Marben, 37.

[30]Rawlinson, 110-11.

[31]Ibid., 112.

busy, and . . . with so many 'sounds' coming out of the clouds from so many different directions, the identification of the position of each one became a matter of considerable difficulty," recalled Rawlinson.[32]

The airship attacks continued on England. Their attacks usually included from one to nine Zeppelins, killing civilians more often than military personnel. But the air raids were still not having the effect on the British public that the Germans desired. The British people were not panic stricken and begging their government to sue for peace.

The churches in London became centers for refuge during a raid, or as one vicar said, "a 'House of Defence' in the neighborhood against 'the terror by night or the arrow that flieth by day'."[33] Patrol groups organized themselves to usher women and children to safety during a raid. One consisted of 300 men and each member had a letter P displayed in his window to alert those outside that a patrol lived within.[34]

The vicars of the local churches could affirm both the fortitude of the British people and that the raids were not having the effect the Germans hoped to create. One pastor from the northeast of London wrote, "If our enemies could see the quiet and calm of our people they would be astonished."[35] Another from east London wrote that his flock "are wonderfully quiet and self-controlled; we have had only one case (of panic), and that

[32]Ibid., 118.

[33]Henry Luke Paget, Bishop of Stepney (ed.), Records of the Raids (London: Society for Promoting Christian Knowledge, 1918), 32.

[34]Ibid., 12.

[35]Ibid., 8.

a very slight one,"[36] Another related that his parishioners "are a cool, collected British gathering who are determined to show that German frightfulness has few terrors for us."[37]

But not everyone would willingly seek shelter in the churches or London's subway system. "I'd sooner die among me own pots and pans,"[38] was the sentiment of one elderly woman of eighty-four. Nor was there a uniform reaction among the children of the city. For some the raids were a traumatic experience and many were sent to live in the countryside or by the sea to recover from their shock. Others relished the excitement of the war and would run out into the dropping bombs to retrieve pieces of shrapnel for souvenirs.[39]

In early May 1916 the War Committee received the Director of Military operations' information on the number of AA guns needed to complete Britain's home defense scheme. As of 20 April the Home Defence had 273 fixed guns and fifty-six mobile pieces. They still required 403 fixed and seventy-two mobile guns to complete their entire Home Defence scheme.[40] The British also intended to provide Home Defence with all the fixed guns built in the future. The mobile AA guns, however, would be divided between Home Defence and the other various theaters of war. The other war fronts required a considerable amount of mobile AA guns. The British Expeditionary

[36]Ibid.

[37]Ibid.

[38]Ibid., 6.

[39]Ibid., 17.

[40]Cab. 42/13/4, "Minutes of the Eighty-Fifth Meeting of the War Committee," 4 May 1916.

Force in France and the forces in Mesopotamia and the Mediterranean combined required seventy-nine mobile guns.[41]

At the beginning of April, Rear-Admiral Vaughan-Lee, director of Air Services, expressed grave concern over the recent Zeppelin attacks. In a memorandum he wrote that England should prepare itself for more frequent attacks. He believed the raiders would attempt to attack England on moonlit nights and even by day. Vaughan-Lee also warned against thinking the Zeppelin attacks had little effect. "The results of such raids . . . can hardly be overestimated . . . it is absurd to say that these attacks have no Military value. They have the greatest effect in delaying the output of munitions, and in a thousand other ways they should appeal to the War Council."[42] In the memorandum Vaughan-Lee included what he thought were the best Zeppelin deterrents. Guns and attacking the airships in their lairs were mentioned as usual, but he also wanted emphasis on developing an incendiary bullet.[43] This important invention would play a pivotal role at years' end in defeating the airships.

Predictably the air raids continued. Attacks on Scotland deprived Commander Rawlinson of mobile guns, as he had to send some of his guns north to the cities of Scotland. Rawlinson took the demand for his guns as a compliment but wrote "it left us sadly short of guns, men, and particularly of officers."[44] Nevertheless, the commander and

[41]Ibid.

[42]Roskill, 342.

[43]Ibid.

[44]Rawlinson, 63.

his men continued to train themselves and engage the enemy. Rawlinson's mobile gun brigade became an efficient and self contained unit. They maintained their own mechanics and gun crews. The gunners learned the basics of repairing the guns and lorries while the mechanics acquired basic gunnery skills. The men became interchangeable if the situation arose.[45] By 27 June 1916, Commander Rawlinson's Royal Naval Mobile AA Brigade consisted of 9 officers, 190 men, 14 guns, 4 searchlights and 24 support vehicles.[46] Although modest in size, the brigade proved capable and improved with every raid.

The raids from 2 April through 2 August resulted in fewer deaths and casualties than in previous months. Britain sustained twenty-four dead and sixty-five wounded during that time. Yet from 31 January through 1 April they lost 158 dead and 339 wounded. Perhaps the improved defense and warning systems could claim some of the responsibility for the decrease in killed and wounded. More than anything, the British were fortunate that the enemy did not attack far more often prior to 1916 when Britain was less prepared. Sir Percy Scott had said, "For 15 months they could have come to London as often as they liked, we were late in preparing for them--they were late in coming."[47] Countrymen often asked Zeppelin commander Ernst Lehmann why Germany did not attack London more often. His answer was poor weather. Lehmann said, "often it was nothing but a stiff wind riding through a moonlit night that kept the ships away from

[45]Ibid., 72.

[46]Ibid., 76-77.

[47]Scott, 292.

England."[48] In addition to storms and wind, Germany's inconsistent raids were a result of never having a large number of airships for combat.

In June, guns continued to be a point of debate in England. The Admiralty and the War Council bickered over the few guns being produced by the armaments factories. Many of the arguments were centered around orders that had been overdue for months. Creating appropriate gun mountings continued to plague the Vickers firm and more guns were siphoned from Home Defence to replace worn out guns on the Western Front.[49] Other unexpected problems arose which prompted the navy to demand and get some of the new guns. H. F. Oliver wrote, "recent North Sea action has drawn attention to the vital necessity of the Grand Fleet having efficient guns for driving off Zeppelins . . . similarly . . . some requirements not foreseen last January have had to be met; for instance, the destroyers on the Belgian Coast blockade and the Tigris gunboats."[50] Again the end result led to the various fronts fighting over the scraps being produced by the arms factories.

During the summer months the British tried innovative ways to bring down Zeppelins. "Traps" were set on the ground to dupe the enemy and lure them to heavy gun fire. The British erected a building enticingly close to the flight path the Germans often used to attack London. The authorities kept the building top secret and rumors that it was a high explosives factory spread throughout the community. In reality it was an empty

[48]Ernst A. Lehmann and Howard Mingos, "Confessions of a Zeppelin Raider," The World Today, (1928), 33.

[49]Cab. 42/15/11, "Note by the Chief of the War Staff," 20 June 1916.

[50]Ibid.

building with its lights left on to make the enemy overhead think it was a factory working late into the night. With this as bait, the military encircled the area with guns and lights to complete the trap. To the military's chagrin it did not work.[51]

By early August the military asked Rawlinson to take the remainder of his mobile brigade to the east coast at Bacton. The purpose of this move was to help intercept and gain early warning of the Zeppelins which seemed to gather regularly at this point. The reason the airships gathered here could be found eight miles off the coast. The Happisburg lightship, permanently moored there, gave the Germans a starting point for their raids. From this point they would get their bearings for attacks on London and elsewhere. When the crew of the lightship spotted the enemy they would phone Rawlinson on the shore to give him fair warning.[52] A feature like the lightship proved valuable for the airships because they often had no clue where they were. It has been stated that Zeppelins had difficulty locating darkened cities. But London made an easier target. As Captain Dietrich stated, "The defence forces can never black out the surf and the course of the Thames. The river is our signpost to London."[53]

The enemy could also follow rail traffic into the cities. British pilot Cecil Lewis described the scene of a steam train wending its way towards London, "A passing train, like a golden snake with a long white ostrich feather plume, wound sinuously into the

[51]Rawlinson, 83-4.

[52]Ibid., 92.

[53]Marben, 114.

smoke-shrouded obscurity of London."[54] The British railways were sometimes called a "steel compass".

Another popular Zeppelin commander, Baron von Buttlar Brandenfels, served on many raids during the war. While commanding L30 in 1916 he experienced an episode which shows how blind the Zeppelins could be. As he flew over England in 1916 L30 became lost. The veteran said, "on the homeward trip we went woefully wrong in our navigation. We dropped our bombs on some English batteries, but we had not the remotest notion of their position."[55] The dirigible landed safely at its base in Germany. Von Brandenfels had to leave a blank space in his report where the bombing location should have been. Afterward, he and his officers sat in a bar, wondering over what area they had dropped their bombs. A special edition newspaper arrived outside. In it, Von Brandenfels read the story of L30 bombing the English town of Maldon. In this case the veteran commander had to rely on the newspaper to inform him of his target. "Four weeks later," he said "I received official recognition for 'accurate navigation'."[56]

Rawlinson's mobile brigade continued to try and outwit the enemy during the summer of 1916. The English believed the Germans were attempting to locate and bomb Sandringham House, the residence of Queen Alexandra, located on the southern coast of England. Rawlinson placed guns and searchlights about a mile away from each other and

[54]Cecil Lewis, Sagittarius Rising (London: Peter Davies 1936), 206.

[55]Marben, 49.

[56]Ibid., 49-50.

Sandringham House. The guns and lights formed a triangle with the lights facing in the opposite direction from the house. Rawlinson believed the Germans would think their target lay within the triangle and bomb there instead of its actual location. The commander claimed the method worked during the next attack as the Zeppelins released their bombs in the triangle. The story takes a pathetic turn when one reads that the triangle was not empty space. Rawlinson wrote, "The village, however, which lay some little distance away within the triangle formed by the guns and searchlight, suffered considerably."[57]

The defeat of the Zeppelin began in earnest during the autumn of 1916. The defense of Britain's great cities progressed but remained incomplete. The planes in the air were now more numerous and powerful, but the invention of the incendiary bullet gave the advantage to the British. This type of ammunition pierced the outer skin of the Zeppelin, and once inside the airship, created a very small explosion that ignited the hydrogen which kept the dirigible flying. Many different types of incendiary munitions were developed during the war, but the British never found exactly what they needed. Each invention had its own flaws in design, performance or production. However, they worked well enough to turn the tide against the German airships. The helmsman of L45, Heinrich Bahn, called incendiary bullets "that invention of the devil."[58]

[57]Rawlinson, 96.

[58]Heinrich Bahn, "In a German Airship Over England," Journal of the Royal United Service Institution, (1926), 108.

Before the war began, the British attempted to create a tracer bullet. This type of ammunition, filled with chemicals that would illuminate it, became known as 'sparklet'. Tracer bullets were "primarily intended to give aerial gunners an indication of the track their bullets were taking, it also had a slight incendiary effect."[59] The sparklet did not work as an incendiary bullet because it would be extinguished as it broke through the Zeppelin's covering. Tracers invented before the sparklet performed poorly. The sparklet's chemical composition, "one part magnesium to eight parts of barium peroxide was found to give good results."[60] The sparklet's official name became S. P. K. Mark VII. T.

J. F. Buckingham invented the various bullets which bore his name. Following a successful test of his phosphorus based incendiary shell in 1915, Buckingham modified the shape of his shell to accommodate any machine gun. In the summer of 1916 the Buckingham bullet received an additional alteration when its inventor changed the shape of the bullet tip. The initial shell had a pointed tip that would create too small a hole in the Zeppelin's fabric. The smaller the hole the less gas escaped, therefore lowering the chances of igniting the gas. Unfortunately for the allies the flat nosed Buckingham had flaws too. The new shell design hampered its accuracy and it would often be damaged when fired from its gun.[61] Further complications emerged when Buckingham bullets were used that had been stored for a few months. The ammunition specialists claimed

[59]Hogg, 52.

[60]Jones,Vol. 3, 383.

[61]Ibid., 384.

Buckingham bullets would ignite a dirigible after four months. In reality two months could leave the incendiary useless, "prompting Trenchard to wonder whether ammunition experts believed that bullets were like cheese, 'better for keeping.'"[62] Despite its flaws, and perhaps evidence that the allies were desperate for such ammunition, more than 26,000,000 rounds were produced during the First World War.[63]

Commander F. A. Brock invented the Brock bullet which proved successful enough in testing during the Autumn of 1915 to have an order of 500,000 placed with him in May the following year. Production problems delayed the order's completion until December 1916. The Royal Flying Corps discontinued using the Brock but the Royal Naval Flying Service used it for the remainder of the war.[64]

England's Inventions Board had been notified to evaluate every suggestion on how to bring down an airship, whether it came from an expert or common civilian. A twelve-year-old girl wrote a letter explaining her invention which would destroy a Zeppelin. To the Inventions Board she wrote, "make a ring mirror with a ring of very bright lights all round it and point the gun through this ring. Then when you see a Zeppelin in the light above in the clouds shoot at once and you will hit it."[65] An Admiral replied, "The British Admiralty begs to thank you . . . it is a great pity that we can not use

[62]John H. Morrow, Jr., The Great War in the Air: Military Aviation from 1909 to 1921 (Washington: Smithsonian Institution Press, 1933), 242-43.

[63]Rimell, 83.

[64]Jones, 384.

[65]Mark Barr, "All Clear," Collier's, (27 July 1929), 48.

your invention, because the shell from a gun . . . droops down in its flight and would not hit the balloon in its light. Light goes straight, but shots go in a curved trajectory. Your father will explain this to you."[66]

John Pomeroy, an Australian bike shop owner, developed an incendiary bullet at his home. Following many attempts Pomeroy finally designed an incendiary suitable for the Inventions Board and half a million were ordered. As might be predicted, difficulties arose during production and "it was found that premature explosions were occurring."[67] Major-General Ashmore had witnessed demonstrations of the Pomeroy bullet and wrote, "it had a tremendous effect on fabric when fired at ground level; but at the heights required for air defence the cold usually prevented its detonation."[68] The Pomeroy, which had been officially dubbed P. S. A., had been improved by late 1916 and the new model called P. S. A. Mark II. Only Home Defence planes used this type of shell.[69] The various incendiaries mentioned were usually combined and used to fill the ammunition drums of the British fighters.

The British military had planned not to use incendiary bullets because they believed the bullets might infringe on certain clauses in the Hague Convention of 1907. The authorities thought the shells use justified because armies on both sides had used

[66]Ibid.

[67]Rimell, 83.

[68]Ashmore, 18.

[69]Jones, 385.

poison gas. The Germans and Austrians had used controversial bullets as well. Although they believed their officers would be subject to reprisals and even death, the British were willing to run the risk.[70]

The British turned the war over England against the Germans by using better and more numerous guns, searchlights and planes, but most importantly, by equipping these planes with combinations of incendiary bullets capable of igniting the hydrogen within Zeppelins.

The first Zeppelin downed by the British, however, did not occur over English soil nor with incendiary bullets. On 6 June 1915, Flight Sub-Lieutenant Rex Warneford intercepted a Zeppelin returning from an abortive raid on England. Warneford positioned his aircraft over the airship and released his bombs onto the enemy ship below. The army airship LZ37 (Luftschiff Zeppelin 37) crashed in flames onto a monastery in Ghent, Belgium. One crew member survived and Warneford became a hero and recipient of the Victoria Cross. He lost his life ten days later when his plane crashed near Paris.[71]

The first airship destroyed over English soil, and with the aid of incendiary bullets, occurred on the night of 2 September 1916. This night began a dismal Autumn for the airship corps. and was also the largest attack of the war, with twelve naval Zeppelins and four army Zeppelins.[72] For the military airship SL 11 (Schütte Lanz 11) it

[70]Cab. 42/15/15, "Minutes of the Ninety-Eighth Meeting of the War Committee," 30 June 1916.

[71]Martin Gilbert, The First World War: A Complete History (New York: Henry Holt and Company, 1994), 171-2.

[72]Robinson, 169.

was to be the last. The difference between the Schütte Lanz and the naval Zeppelin was the composition of the framework of girders and beams from which the airships were constructed. The SL's were made of wood and the naval Zeppelins of aluminum steel.

As SL 11 attacked London, heavy AA fire drove the airship north. The guns and searchlights did their job, first by driving the enemy ship away from the capital, and second by drawing Home Defence pilot's attention to the enemy. Pilot Leefe Robinson attacked SL 11 with two drums of incendiary bullets without effect. Robinson then attacked from below and behind the airship. Midway through the third drum of incendiaries, Robinson saw the tell tale pale red glow inside SL 11. The crew was doomed.[73] The airship, engulfed in flames, could be seen for miles. An eyewitness described the dirigible: "She sailed helpless across the sky, a blazing tomb drifting for miles through the air . . . in the searchlight beams she looked like an incandescent bar of white-hot steel."[74]

The Home Defence learned another useful deterrent that night. The spectacle created by a Zeppelin plummeting to earth in a burning death dive would often be too much for its comrades. Major-General Ashmore stated that, on the night Robinson shot SL11 down in flames, four other Zeppelins were in the vicinity of the flaming airship and all four immediately turned for home.[75] After the war, Captain Martin Dietrich, commander of L42, recounted the effects on his crew of witnessing L48 being shot down

[73]Ibid., 172.

[74] "Special Constables' Notes and Contrasts," Times (London), 25 September 1916, p. 11, col. 2.

[75]Ashmore, 23.

in June 1917:

> The men in the airship over there can only make their wills . . .
> it is a pillar of fire . . . a meteor hissing down from the sky.
> It is all over for the men in that ship. We of the L42 are not
> exactly timid folk. But our faces are as pale as death.
> The men at the controls have hard work to keep their
> hold on the wheel . . . I thought I saw one or two comrades,
> little black specks in the sky, jump out of the blazing torch.
> Better to be broken to pieces than burnt to death.[76]

The sixteen airship's attack resulted in failure; four were killed and twelve injured below in London. The total damage inflicted on the city amounted to £21,072. While the cost of the airship alone amounted to £93,750. Moreover, the loss of a trained and experienced crew could not be as easily replaced, and the destruction of SL11 gave a boost in morale to the people of London and confidence to the Home Defence.[77] Authorities inspected the charred remains of SL11 where it crashed, in a field in Cuffley. There they found evidence that Leefe Robinson had help in downing the dirigible. "The four Maybach engines lay in different parts of the field . . . in the crankcase of one was found a shell-hole, plugged with cotton waste, proving that the airship had been hit before Leefe Robinson gave her the *coup de grace*."[78]

Home Defence forces brought down two more Zeppelins in late September and again the AA and searchlight crews played an important role. On the night of 24 September ten airships attacked England. Three of the Zeppelins were new models, the

[76]Marben, 119.

[77]Robinson, 178-9.

[78]Ibid., 179.

L31, L32 and L33. They were each 650 feet long and held 55,200 cubic meters of gas. They also carried over 9,000 pounds of bombs, 8 machine guns and could travel 70 miles per hour.[79]

The three new Zeppelins attacked London while the older models steered their airships north towards the Midlands. As the Zeppelins flew over London they dropped bright flares from their ships to dazzle the gun crews and observers on the ground. They also did this to help them see what lay below, as darkened cities and countryside provided few clues for navigation. The Germans also dropped flares to try and fool the British into not firing. To avoid being hit by their own AA fire, the British planes dropped flares to signal the guns below to stop firing.[80]

In the L31 Heinrich Mathy steered clear of the heavier defences in north London and successfully bombed the city in the south. The other two ships were taking much heavier fire as they hovered over strong AA sectors. Captain R. Böcker guided L33 over London and dropped his bombs for a successful raid. The Zeppelin left warehouses, oil depots, lumber yards and tenements burning out of control. Six died and twelve were injured from the destruction of L33 alone.[81]

But the Zeppelin completed its attack under very heavy AA fire. Nearby in L31,

[79]Ernst A. Lehmann, Zeppelin: The Story of Lighter-than-air Craft (London. Longmans, Green and Co., 1937),169.

[80]Ibid., 171.

[81]Robinson, 184-5.

Heinrich Mathy witnessed the storm of shells bursting around L33:

> Hundreds of guns opened fire at it; but in the midst of a hail of bursting shells, Böcker steadfastly followed his course. Now, his bombs were striking. Great fires sprang up under the airships and covered the city with a cloud of smoke that obscured the rays of the searchlights. Another searchlight groped through the smoke and illuminated the control car. Flaming incendiary rockets hissed by on all sides and the shells kept bursting closer and closer.[82]

Finally a shell struck the airship and exploded within it. Many gas bags were destroyed or damaged and the airship started to descend 800 feet per minute. L33 struggled to reach the coast but an airplane flown by Lieutenant Brandon attacked her repeatedly but could not ignite the crippled airship. Böcker forced the plane down in a field at Little Wigborough and surrendered peacefully with his twenty-one member crew.[83]

Captain Peterson's L32 met a more grisly fate that night. The English guns, searchlights and planes worked in deadly unison. L32 dropped a few bombs on London but quickly became the target of AA fire and the beams of the searchlights. Peterson abruptly disposed of his remaining bombs and attempted to flee. An English battery alleged they struck the Zeppelin twice. But Second Lieutenant Frederick Sowrey would finish off the prey. He fired several drums of incendiary bullets into the airships envelope until he saw it start to burn.[84] Mathy witnessed the demise of L32 as well, "Suddenly, the sky burst into fire as if a stroke of lightning had split it apart . . . we in the L31 saw the

[82]Lehmann, Zeppelin, 172-3.

[83]Robinson, 185.

[84]Ibid., 188.

ship catch fire. First the bow burned, and then the flames tongued over the whole envelope . . . for eighteen terrible seconds the blazing ball hung like a fateful planet in the sky; then it burst asunder. A glowing mass with a tail of whirling flames fell like a comet."[85]

The next morning journalist Michael MacDonagh arrived at the scene of the crash in Billericay, England. Some people were profiting from the downed Zeppelin, erecting fruit and cake stands to serve the throngs of people arriving to view the sight. MacDonagh described the remains of L33 as resembling the skeletal remnants of a dinosaur.[86] But a far more lurid sight awaited him on the floor of a nearby farm. In a barn the burnt bodies of the crew were laid in a neat row on the floor. MacDonagh wrote, "They presented a ghastly spectacle . . . but I confess that my uppermost feeling in the barn was sympathy for these ill-fated young fellows . . . as the bodies lay huddled together on the floor of the barn, smelling foully, I saw in them nothing of the majesty of death; only its gruesomeness and its terror in the most abominable shapes."[87]

L32's commander Peterson had been found unburned. He apparently jumped from the burning ship. Search crews discovered his body hundreds of yards from the scorched crash sight, partially imbedded in the earth with his hands clutched behind his head. Evidently he attempted to escape the searing heat.[88]

[85]Lehmann, Zeppelin, 172.

[86]MacDonagh, 132.

[87]Ibid., 133.

[88]"The Burnt Raider," Times (London), 26 September 1916, p. 9, col. 5.

Despite the London public's jubilation over the recent success against the Zeppelins, E. B. Ashmore believed that many were disappointed over the fact that the main villain, Commander Heinrich Mathy, had not been brought down.[89] London would have to wait little more than a week to witness his burning downfall. On the night of 1 October Mathy returned to bomb London, "the grave of his comrades."[90] Mathy in L31 bombed London but quickly came under heavy fire from the batteries below. As the shell bursts surrounded the dirigible, the beams of many searchlights kept L31 illuminated. E. B. Ashmore wrote, "so many lights that the ship looks from the distance to be floating on a pyramid of rays."[91] Several nearby planes saw the commotion and steered toward it. Second Lieutenant W. J. Tempest loosed his incendiary bullets into Mathy's airship. The gas ignited and sent the crew of nineteen to a fiery death, crashing in Potters Bar, England.

The death of Germany's most revered Zeppelin commander had a devastating effect on the entire German air service. Heinrich Bahn, who had once served under Mathy, wrote of the fallen master, "What a man he was . . . he laughed at the greatly improved English gunfire and his crew would tell how he would slow down his ship and deride the English gunners to hit him as he flew over London . . . with him the life and soul of our airship service went out . . . it was never the same again."[92] Even some of

[89]Ashmore, 25.

[90]Lehmann, 175.

[91]Ashmore, 26.

[92]Bahn, 107-8.

Mathy's enemies felt a sense of loss. "Writing at this distance of time," Ashmore wrote after the war, "one can regret that the parachute was not then available as a means of escape from a burning airship."[93] Eerily, Mathy's final journey occurred during his thirteenth raid on London.[94]

Despite the AA guns apparent help in bringing four Zeppelins down in a month, criticism continued. The pilots that brought down L32 and L31 claimed the searchlights were beneficial but the AA fire missed terribly. Second Lieutenant Tempest, who shot down L31, reported no shell bursts within three miles of the Zeppelin.[95] However, the Times (London) reported that spectators "distinctly saw half a dozen shots hit the airship."[96] Even Ernst Lehmann claimed the dirigible had been surrounded and damaged by AA fire.[97] The pilots often seemed to criticize the ground gun's accuracy, yet Commander Rawlinson would refer to the airman in glowing terms as "our gallant aviators."[98]

During an October War Cabinet meeting Lord Curzon discussed pilot's reports of lackluster AA aim. David Lloyd George said he had heard the contrary, that the AA crews claimed to be good shots and had brought down the third Zeppelin destroyed

[93]Ashmore, 27.

[94]Lehmann, 176.

[95]Robinson, 195.

[96]"Shots seen to Hit," Times (London), 20 October 1916, p. 9, col. 6.

[97]Lehmann, 175.

[98]Rawlinson, 129.

during September. To help clear matters, the committee called in Major-General F. C. Shaw. He defended the apparent lack of AA success by harping on old excuses. Montagu mentioned the slow gun production which left the air defenses with only a third of the three-inch guns needed. Complicated gun mountings also still caused delay. As for the poor aim, Montagu reverted to excuses which hampered the gun crews back in 1914: lack of height-finders, not enough practice time or practice ammunition.[99]

The War Committee turned their discussion to trains during air raids, which raiders could follow into England's cities. E. S. Montagu, the minister of munitions, claimed threats of violence had been made in England's Midlands if trains were not halted during raids. The committee decided against such a measure because stopping trains resulted in delaying the movement of wounded, munitions and troops. Secretary of State for War David Lloyd George agreed, saying "the stoppage of trains put everything out of gear and interrupted the food-supply of the country."[100]

Lord Curzon, president of the Air Board, then brought up the fact that demands on airplanes from England's various fronts and from her allies exacerbated Home Defence's shortage of planes. Lord Curzon stated that Britain needed 180 planes for Home Defence but currently claimed fifty-eight. Romania and Russia both asked Britain for planes; Prime Minister Asquith even said "we had recently been asked by the Sherif to send a flight to the Hedjaz."[101]

[99]Cab. 42/21/1, "Minutes of the One Hundred and Eighteenth Meeting of the War Committee," 3 October 1916.

[100]Ibid.

[101]Ibid.

Lord Grey believed cities in England deserved to be defended before nations such as Romania. But he held the minority on this issue. Balfour believed "it was a question of choosing between military necessity and Parliamentary difficulty."[102] Lloyd George agreed with Balfour that the Romanian front must take priority. He said during the meeting, "a Roumanian military defeat was a much more serious matter than the destruction of a few houses in Sheffield. The Sheffield workers, he felt, must be made to see reason. He suggested that the War Office and the Admiralty between them might contribute 12 aeroplanes to Roumania."[103]

Similar problems arose over AA guns. The War Committee discussed the strained relations between Germany and Norway. The French and British obtained many chemicals and minerals from Norway vital to munitions production. To protect her factories Norway requested AA guns from Britain.[104]

The Norwegians asked for ten guns to defend themselves. The authorities in London knew well the importance of Norway's plight, but as the Chief of the Imperial Staff William Robertson stated "we could only help Norway by denuding ourselves."[105] Despite the questions over how effective the AA guns were, the British military were reluctant to relinquish even ten. The French and British each decided to provide five, but

[102]Ibid.

[103]Ibid.

[104]Cab. 42/22/13, "Minutes of the One Hundred and Twenty-Sixth Meeting of the War Committee," 31 October 1916.

[105]Ibid.

Norway had to purchase the weapons.[106] The Home Defence had again been knocked down the pecking order.

On the night of 27 November seven Zeppelins attacked England, and two were brought down by British pilots. The L34, piloted by Max Dietrich, met its fate off Hartlepool. Commander Kurt Frankenberg and his crew in L21 fell at Lowestoft. Just prior to the attack, the commanders had been celebrating the 46th birthday of Max Dietrich. At the announcement of clear weather, the party quickly ended as crews assembled for flight. Some men, perhaps reflecting on recent misfortunes of the German air service, felt a sense of foreboding. Historian Douglas Robinson described the scene, "The officers dropped their napkins and rushed from the table. Only Kurt Frankenberg of L21 paused to shout back, 'Leave the birthday decorations, we'll celebrate tomorrow!' But his executive officer, young Hans-Werner Salzbrunn, soberly confided to his friend, Richard frey of L22, 'I know we won't come back from this flight' . . . next day only a patch of scummy oil marked where Dietrich's birthday had ended in death for him and all his crew."[107] No survivors emerged from either of the downed Zeppelins.

By November 1916, Field-Marshal Viscount French still controlled Home Defence and at a 27 November War Committee meeting, the military reiterated the importance of both AA guns and airplanes in defending Britain.[108] Though the Zeppelins

[106]Ibid.

[107]Robinson, 197-8.

[108]Cab. 42/25/10, "Minutes of the Hundred and Fortieth Meeting of the War Committee," 27 November 1916.

were reeling, the English air defense needed to continue to grow and improve. Ahead lay almost two more years of war, and the Home Defence faced challenges, new and old.

Challenges New & Old

CHAPTER THREE

In 1917 the German Zeppelin commanders longed for the insufficient English defense they experienced early in the war. The recent misfortunes allowed doubt to creep into their minds. Some in the German fleet command asked if the end result justified losing several Zeppelins a raid, an event which now occurred on all fronts the dirigibles were used. Peter Strasser, as head of the German naval airship service, however implored his superiors to continue using the airships. The Germans decided the key to evading the improved guns and airplanes was to increase the ceiling, or maximum altitude, of the Zeppelins.[1]

The improved airships achieved the desired heights of 20,000 feet and at such a level the enemy would be far out of reach from the English guns and planes. But the German solution came at a cost. Even before the aerostats reached the new heights their crews experienced the discomfort of high altitude flying. With the new airships, however, the effects of altitude sickness and cold went to extremes.

In January 1918, Zeppelin commander von Buttlar-Brandenfels delivered a lecture at the Marine Institute in Berlin on airship attacks. He spoke of the impact flying at 20,000 feet had on his men: "a feeling of nausea and headache is experienced, and vomiting follows."[2] Steersman Heinrich Bahn knew well the debilitating effects of flying twenty hours or more at close to 18,000 feet. The ordeal would render him useless for days, and no one but a fellow Zeppelin crewman could understand the trials of such

[1]Robinson, 205.

[2]Treusch von Buttlar-Brandenfels, Airship Attacks on England (London: J. Selwyn and Co., Ltd., 1919), 32.

flights. As Bahn recalled,

> "Twenty hours of this ordeal would bring me home exhausted, deaf and sometimes giddy. For two days afterwards I was good for nothing, and our seaplane pilots at Borkum would laugh at us--that hurt! For those fine gentlemen did not know what it means to do twenty hours at those heights, at night and in that cold. What did they know about it, they who could remain out for less than six hours and that too at never more than 3,000 metres."[3]

The frigid cold also took a severe toll on the men. Zeppelin crew's reminiscences were often replete with references to the biting cold, which, as Captain Dietrich said, "was no nectar for the lungs."[4] The cold would create intolerable conditions for the men trying to navigate and work on the airships. The temperature could plummet to thirty-five degrees below zero during an airship flight. Otto Mieth, an officer on the L48 in June 1917, recalled that once the temperature fell seventy-two degrees from the time the ship left Germany on a trip to England.[5] Captain Dietrich remembered the effects the arctic cold had on he and his crew, "Airship voyages in winter . . . were certainly no pleasure trips. Your arms froze stiff to your body."[6] Dietrich even claimed that the cold caused men's fingers to split and bleed.[7] With every inch of an airship accounted for, men

[3]Bahn, 111.

[4]Marben, 105.

[5]Otto Mieth, "Shot Down by the British: A Zeppelin Officer's Story," The Living Age (17 April 1926), 144.

[6]Marben, 111.

[7]Ibid., 64.

carried their food in their pockets and it would often freeze as solid as a brick.[8]

Though the frosty cold could make the men miserable, the effects it had on machines could be far more dangerous. The aforementioned June 1917 flight made by Otto Mieth in L48 is a prime example of an airship whose doom was aided by the cold. L48's liquid compass froze as it approached England at great heights. Luckily for the air crew they found their target, Harwich. But Harwich had improved its air defense and tried to blast the enemy from the sky. As Mieth recalled, "The ship was enveloped in a cloud of gas, smoke, and flying missiles. Hissing like poisonous serpents, whistling, howling, visible during their whole trajectory . . . Peng! Peng! Bellowed the English guns in their sharp staccato, like a great pack of hounds at the heels of a stag."[9] The guns could not bring down their quarry and L48 successfully bombed Harwich. The airship quickly made its way toward the coast to try and reach the North Sea before sunrise. Although the airship had successfully bombed its target, the trouble was just beginning for the balloon and its crew. "But our frozen compass was our undoing." Mieth said, "Instead of steering to the east, we inadvertently headed toward the north, and before we discovered our error we had lost valuable time."[10] An English pilot soon found the airship and made the L48 pay for its error, firing incendiary bullets which set the aerostat ablaze.

[8]Bahn, 113.

[9]Mieth,145.

[10]Ibid.

Mieth's captain watched the fire rage through the ship, turned and said to Mieth "It's all over."[11] When L48 crashed in Ipswich Mieth fell against a wall and his fellow crew members fell on top of him, protecting him somewhat against the flames. Though he suffered broken and burned legs and many lacerations, Mieth and another crewman were the only survivors of the seventeen member crew.[12]

One of L48's engines failed during its ill-fated raid. This could possibly be attributed to the cold conditions as well. Bahn stated that, "Engine breakdowns grew more frequent as the cold grew more bitter."[13] No one was immune to the consequences of sub-freezing temperatures. Heinrich Bahn remembered returning from a raid at such a height that "the earth was scarcely visible."[14] On that return journey much of the crew became incapacitated from the altitude and cold, thereby neglecting their jobs, causing radiators, several engines and fuel lines to freeze.[15] By forcing the dirigibles to greater heights, while out of Home Defence range, the AA guns and planes were doing their job. But bombing from such heights also made aiming or concentrating bombs on desired targets very difficult. Therefore Zeppelins would have to descend to better locate and attack their targets, therefore bringing them back within range of English air defense.

[11]Ibid., 146.

[12]Ibid.

[13]Bahn, 110.

[14]Ibid., 114.

[15]Ibid., 114-15.

Zeppelins attacked London on only one more occasion, this occurring on 19 October 1917. Although Zeppelins bombed other sections of England and performed until late in war in other theaters, London faced a new challenge. This came in the form of large airplanes built specifically for bombing missions. The Gotha and later Giant bombers became the new villain of London's air defense. The Gotha measured seventy-eight feet across its wings and had a thirty-nine foot fuselage. The plane carried a crew of three, was defended by three machine guns, and flew at eighty mph.[16] The Giants were one of several types of planes built from the German R class of heavy bombers. The Giants were properly named since their wing span surpassed 138 feet "within three feet of equaling that of the B-29 Superfortress."[17]

London witnessed no raids by balloon or plane during the winter of 1917 but the English continued to fortify themselves for raids certain to come. The Germans prepared their planes and improved "height climber" Zeppelins for renewed attacks. But reminders of the attacks from the air were not hard to find. Some came in the guise of Zeppelin crewmen washed onto England's shores, charred and distended.[18] To reassure the public they would be safe, Lord French praised the air defense and reassured the public that they would be safe. "Taken as a whole," French said in January 1917, "the defensive measures have been successful . . . the Royal Naval Anti-Aircraft Corps. has been arduous and has

[16]Morrow, 221.

[17]Fredette, 134.

[18]"News in Brief," Times (London), 15 January 1917, p. 5, col. 5.

shown consistent improvement: the guns and lights have been effectively handled."[19] One could also support local charities by purchasing 'relics,' parts of downed Zeppelins, from towns where airships crashed. The Kaiser's birthday was a popular occasion for such morbid events.[20]

Rawlinson's mobile brigade continued to be depleted of guns, with most being used to fill gaps in the defense along the paths commonly taken by Zeppelins, until it was demoted to a mobile battery of five guns. After an uneventful winter in 1917, the Admiralty transferred Rawlinson to the army to become commander of an anti-aircraft sector in London. The authorities also divided the capital's defense into north, east and west sub-commands with Rawlinson leading the west sector.[21]

Rawlinson's sub-command was comprised of 19 gun stations, 36 searchlights, 32 officers and 600 men. London's defense scheme consisted of center gun stations which were surrounded by another ring of guns and lights, then an outer ring of the same. This forced the enemy to fly through several waves of gun blasts. Observers were stationed at a distance from the gun stations and their job was to watch the gun's shell bursts in relation to the enemy aircraft and telephone the information to the gun crews so they could adjust their fire.[22]

[19]"Lord French on Home Defence," Times (London) 24 January 1917, p. 4, col. 6.

[20]"News in Brief," Times (London), 29 January 1917, p. 3, col. 5.

[21]Rawlinson, 136-150.

[22]Ibid., 159-62.

Lone Gotha bombers started to attack England in February and March 1917 to gain some intelligence before sending the planes over in greater numbers. The planes came in force on 26 May, attacking Essex, Kent and Folkestone. The attack was devastating, killing 94 and wounding 192. No enemy planes were downed over England.[23] The raiders again seemed to be able to bomb England and return unharmed.

London was not spared, being attacked by fourteen Gothas on 13 June. The bombs killed 162 and wounded 432 people, becoming London's greatest loss of life during a raid. The air defense performed poorly. Though AA guns brought down a German plane during a raid on 5 June off the English coast, the planes and guns proved ineffective against the bombers attacking in formation. To combat the Gothas during the deadly 13 June raid, many AA guns opened fire and over ninety British planes were in the sky to thwart the enemy planes. But the defense proved inadequate as only five of the defending planes could even locate the enemy and attempts to shoot them down were unsuccessful.[24] Concerning the ground defense E. B. Ashmore wrote, "The anti-aircraft fire was reported as being far too low; its only effect was to increase the casualties on the ground by one killed and nineteen wounded."[25]

Lieutenant-Colonel Rawlinson visited the north sub-command during the 13 June day raid. Despite the great destruction and loss of life, Rawlinson found the raid "an

[23]Ashmore, 169.

[24]Ibid.

[25]Ibid., 34.

invaluable opportunity of studying the defence system in action."[26] He quickly became impressed with the efficiency of the well trained north sub-command. His western defenses were not so satisfactory, and Rawlinson endured problems with its sub-command which often experienced changes in personnel, leading to disorganization. The amount of ground which had to be defended in his sub-command proved difficult as well. As Rawlinson noted "The stations were widely scattered. . . the total area . . . was about 500 square miles."[27] The commander's gun stations were manned by a wide array of men. Many had been wounded at the front while others could neither hear nor read.[28]

Following the costly June raids Parliament discussed the Gotha attacks. Noel Pemberton-Billing, a former lieutenant in the R. N. A. S. and current MP, once again chastised the military and government for not providing the country with better defense and the air forces with stronger planes. He discussed the problems of shooting down planes, "The chances of bringing down heavier than air machines in a daylight raid are very small. The chances of bringing them down, should they commence night attacks by aeroplanes, are practically nil . . . a searchlight can barely pick them up . . . their size is so infinitesimal that it is impossible to keep a beam on them."[29] Pemberton-Billing called the defense system criminal and brought up a method he and many others believed would

[26]Rawlinson, 165.

[27]Ibid., 169.

[28]Ibid., 171-72.

[29]Parliamentary Debates (Commons), 5th ser., vol. 94, (1917), col. 128.

truly punish the Germans: reprisals. "I very much regret that we are not sufficiently bloodthirsty to want it to be the enemy's undefended towns that are to suffer," Pemberton-Billing said in Parliament 5 June, "a strong offensive in the heart of Germany . . . will have more good effect than all the talking, and all the protests, or all the anti-air guns over so many square miles."[30]

Even clergymen condoned reprisals against Germany. The Reverend Bernard Snell wrote to the Times (London) and stated, "All war was reprisal, and no man had a right to ask his fellow-citizens, willing or unwilling, to be marched like sheep to the slaughter out of respect for his aversion to retaliatory measures."[31] Others disliked the idea of reprisals on German soil and especially the fact that religious leaders were calling for such measures. W. B. Selbie of Mansfield College, Oxford believed that raids on German towns were unethical and asked that England abstain from "methods of barbarism which are as futile as they are wicked."[32] Later in the year London's metropolitan mayors met to give support to the idea of revenge raids against the enemy. One of their resolutions stated, "That an air offensive on the largest possible scale should be undertaken forthwith against the German cities and towns without distinction."[33] Joynson-Hicks believed that reprisal raids were possibly the only true defense against air attacks. Exasperated, he asked in Parliament that the government be forthcoming if

[30]Ibid., col. 135.

[31]"The Reverend Bernard Snell on Reprisals," Times (London), 9 July 1917, p. 10, col. 4.

[32]"To the Editor of the Times," Times (London), 12 July 1917, pg. 4, col. 3.

[33]"Policy of Reprisals," Times (London), 5 October 1917, p. 10, col. 5.

reprisals were the only way to combat the enemy, instead of providing the House with "soothing syrup from time to time . . . in regard to these raids."[34]

David Lloyd George, prime minister since 1916, also believed England's air defense would be greatly enhanced by a large force of English planes attacking Germany. In his memoirs he gives the reason the raids could not yet take place: "it was decided that we had not as yet a number of machines available of sufficient power and range to be able to embark on a regular programme of long-distance bombing raids on German towns. And . . . would only exasperate the German people and lead to an intensification of their attacks."[35]

The War Cabinet discussed reprisals on 5 June 1917. While it believed German cities such as Manheim and Saarbrücken were within flying range of allied lines, it restated Lloyd George's words that a large contingent of planes were needed but were at the time unavailable. Some members also wondered if large raids on Germany would enrage the public, as was the case in England, instead of demoralizing them.[36] England would have to rely on their Home Defence guns and planes.

Opinions concerning reprisals on German soil inundated the editorials of the Times (London), even back to 1915, when prominent men such as writer Arthur Conan-Doyle and A. F. Pollard wrote to express their opinions. Conan-Doyle, an ardent proponent of vengeance raids, wrote to the Times (London) that British planes should be

[34]Parliamentary Debates (Commons), 5th Ser., vol. 98, (1917), col. 592.

[35]David Lloyd George, War Memoirs (London: Ivor Nicholson and Watson, 1934.), vol. IV, 1860.

[36]Cab. 23/3 (154), "Minutes of a Meeting of the War Cabinet," 5 June 1917.

stationed in force in France and bomb three times as many targets per German raid. He wrote in the fall of 1915, "I can well imagine that our airmen would find such work repugnant, but they must bear in mind that women and children have for a long time been sacrificed over here,"[37] The following day rebuttals to Conan-Doyle's ideas were printed. Sir Edward Clarke replied, "how can we dare to pray to the God of righteousness, or hope for His blessing, if we are ready to copy our enemies crime? It may be our misfortune to be defeated in this war; it will be our own fault if we are disgraced."[38] A. F. Pollard agreed with Clarke, adding, "Civilized peoples do not kill a criminal's womenfolk and children because they cannot lay hands on the criminal."[39] A few days later Conan-Doyle replied to the gentlemen who disagreed with him. While he respected their views he reiterated that bombing enemy towns during war time was justified. On 22 October Pollard responded by saying vengeance attacks against innocents were, "a relic of barbarous custom surviving through the blood-feud, vendetta, private war, and the duel to modern times."[40]

Enemy bombers assaulted London and other English cites into July and the air defense continued to experience problems. Too few aircraft were being brought down and AA guns were firing at their own planes as the Gothas returned safely to Germany after their deadly bombing missions. Many more English aviators were employed than

[37]"To the Editor of the Times," Times (London), 15 October 1915, p. 8, col. 4.

[38]"To the Editor of the Times," Times (London), 16 October 1915, p. 9, col. 4.

[39]Ibid.

[40]"To the Editor of the Times," Times (London), 22 October 1915, p. 9, col. 4.

were available early in the war. Over a hundred planes at times would teem the skies over London often only to land after an unsuccessful attempt to even locate any German machines. Despite the great strides in English air defenses, it was becoming obvious that the guns and planes were not the entire answer to the air defense dilemma. The large cumbersome airships, while having advantages of their own, provided an easier target to locate with their massive 644 foot long frames, over 78 feet in diameter and 91 feet tall.[41] British pilot Cecil Lewis knew well how difficult flying in the unlit night sky could be, let alone finding a rapidly moving object. What he and the ground guns sought to help them locate the unseen enemy were the fleeting glimpses provided by the searchlights. As Lewis explained, "To the east, far down the Thames estuary, two searchlights roved the heavens, impatiently hunting for that white flash in their beams—the wings of an enemy machine."[42] Cecil Lewis disliked being placed on home defense duty. He did not like the type plane he initially had to fly and long stretches between raids could be boring. But it was evident to Lewis that the ground defenses had as difficult a time as he in locating bombers at night, as he often came under fire when the English batteries mistakenly took him for a German. "The gunners were as blind as I,"[43] he wrote.

Rothesay Stuart Wortley flew for the Home Defence as well and could also affirm Lewis' reports of poor AA fire. Although England had produced more planes for defending England, Wortley and his pilot found themselves alone over a sector while a

[41]Robinson, 380.

[42]Lewis, 215.

[43]Ibid., 216.

formation of Gothas approached London. He described the experience and the woeful AA fire: "Here we were, in solitary glory still, one wretched Bristol Fighter, between London and the raiders . . . the anti-aircraft guns had by now opened up in good earnest, and the sky was smothered with the puffs of bursting shells . . . at the wrong altitudes, alas! Two thousand feet above and three thousand feet below the Huns,"[44] The British realized the problem was poor communication between the ground forces and the planes in the sky. Pilots could not communicate with each other or the ground via wireless because this method had not been sufficiently developed for planes. The technique developed to inform British pilots from which direction the enemy was coming consisted of a large, white canvas arrow being unrolled onto the airfield over which the planes were flying. If the enemy aircraft were approaching from the north-west, then the arrow would be pointed in that direction and the Home Defence planes would fly towards the north-east to intercept the raiders.[45] Ashmore believed this method was ineffective because too much time elapsed between the ground forces learning the direction of the approaching foes and actually rolling out the arrow to alert the pilots. He also stated that aviators had too little practice with such a procedure and therefore the technique was little help.[46] The British, nonetheless, learned an important point. "The great principle of air defence was . . . although aeroplanes are the first means of defence, they are ineffective unless

[44]Wortley, 114.

[45]Rawlinson, 266.

[46]Ashmore, 38-39.

supported by a control system on the ground."[47]

Gothas continued to raid London and other parts of England through July, often with heavy casualties and brazenly carried out during the day. On 31 July the War Office ordered a revision of air defense in London. Concurrently the authorities recalled E. B. Ashmore from the western front to head the ground and air defenses of London. Ashmore, described by Lloyd George as "a most efficient officer,"[48] believed the greatest challenge facing London were the lethal daylight raids in which bomber planes would fly over England in either V or diamond shaped formations. To combat the menace The Home Defence devised a barrage of anti-aircraft fire. Rawlinson described the barrage: "a curtain of bursting shells across the aerial path which the attacking planes might be desirous of following in order to reach their ultimate objectives."[49] The AA fire, therefore, created a deck of exploding shells through which, enemy aircraft would be foolish to risk penetrating. Many different barrages were established to occupy the various paths that planes and airships often followed into England. To avoid confusion each had its own peculiar name: "The Ace of Spades," "Mary Jane," and "Cold Feet" were just a few.[50]

English towns suffered heavy casualties during the July raids and grumbling for more protection ensued. Any ideas of bringing guns and planes from the front at this point in the war were scotched by Prime Minister Lloyd George. At 10 Downing Street

[47]Ibid., 39.

[48]Lloyd George, Vol. IV, 1864.

[49]Rawlinson, 180.

[50]Ibid., 189.

the prime minister spoke, "we must put the safety of the soldiers at the front first . . . and I say so without any hesitation. If anyone in this country says 'Ourselves first and our soldiers afterwards' well, then, they had better find another government."[51]

Ashmore's new defense scheme combined air and ground forces under his command and became known as the London Air Defence Area (L. A. D. A.) at the end of July. The barrage system was a part of L. A. D. A. and was intended to break up the invading plane formations. The British hoped that by disrupting the formations the separated enemy planes could more easily be attacked by the defense squadrons and by not being in formation the German planes could not concentrate their bombs on any specific area. Ashmore moved the barrage guns twenty miles east of London; fighter planes were attacked on either side of the barrage. The planes could therefore attack the enemy before they reached the AA guns and after the bombers passed through the barrage, the Home Defence pilots could focus on the stragglers that were created by busted formations. Having the AA fire contained to specific areas meant fewer allied planes were fired on by their own ground guns.[52]

The War Cabinet learned from the July raids that despite increased numbers of German planes in the sky many Home Defence machines were attacking the enemy, "singly or in small groups, and it was difficult for these to attack a number of enemy machines in formation."[53] But the barrage would often separate planes from the squadron

[51]"Defence of London," Times (London), 14 July 1917, p. 10, col. 5.

[52]Hogg, 54-55.

[53]Cab. 23/3 (179), "Minutes of a Meeting of the War Cabinet," 9 July 1917.

making them easier prey for British fighters. Rothesay Stuart Wortley recalled flying against bombers forced out of formation, "We were over London. Straggling a few hundred yards behind the rest two Gothas flew: an interval of thirty yards between them, and the hinder one a little to the right hand of the other. These we resolved to attack."[54]

Commander Rawlinson described an interesting barrage method employed by the ground guns to deflect the formations away from London. Barrage fire was aimed at the formation's lateral edge; naturally the formation would veer away from the line of shell bursts where another barrage of shell fire would again appear on its flank. Rawlinson described the result, "This operation would be carried out continuously along the path of each attack, the courses being by this means repeatedly deflected from their original direction until the attacks were turned completely round . . . under these circumstances their usual and not unnatural procedure was to drop their bombs at once, wherever they happened at the moment to be,"[55]

The Home Defence forces continued to experiment with different ideas to defend England against air attacks. One proposed concept called for much of south England to have its skies illuminated by countless searchlights. Flying high above this scene would be British planes which could look down and see the darkened form of the enemy bombers below. E. B. Ashmore wrote that "It would have been cheaper to move London."[56] Other ideas included flying above enemy planes and pouring acid upon them,

[54]Wortley, 114.

[55]Rawlinson, 187-88.

[56]Ashmore, 49.

or having, British planes meeting the raiders over the ocean, flying ahead of them and releasing poison gas in their wake.[57] These ideas were poorly thought out and were never promoted beyond the planning stage.

Gothas attacked London only twice during August 1917, nine and ten planes attacked on 12 and 22 August respectively. The planes and AA guns each brought down two Gothas during these raids.[58] These losses were not acceptable to the German air service and became the last daylight raids on London. Starting 3 September, the planes sought protection in the night sky, as the Zeppelins had done. "British defences had considerably stiffened since the first raids, and the slow speed and low attack altitude prevented the Gothas from evading the ever-improving British air and ground forces."[59] The 3 September night attack, however, proved to be particularly deadly. A German plane succeeded in dropping two bombs on a naval barracks killing 132 and injuring 88.[60]

The use of balloon aprons became an important innovation for Home Defence starting in September 1918. The aprons were comprised of balloons connected horizontally by a strong steel cable from which steel wires streamed down a 1,000 feet.[61] By late September and early October several aprons were in place over east London. Major-General Ashmore said the balloon aprons, "would be let up nightly to heights

[57]Ibid.

[58]Ibid., 170.

[59]G.W. Haddow and Peter M. Grosz, The German Giants: The Story of the R-Planes 1914-1919 (London: Putnam, 1962), 27.

[60]Ashmore, 52.

[61]Ibid., 55.

varying between 7,000 and 10,000 feet and thus present a line of streamers 1,000 feet deep over a distance of 20,000 yards."[62]

The first apron tested over Richmond Park outside London proved deadly when a gust of wind carried away two of the men trying to assemble the apron. They could not cling to the apron for long and fell from great heights to their deaths. Ashmore, while dismayed, could not help but think as he watched the men plummet, that German pilots would meet the same fate if their aircraft became entangled in the wires.[63]

The balloon aprons were beneficial to the defense of London in several ways. First, the enemy aircraft could run into the cables in the night and crash. Second, if the bombers attempted to avoid the apron they could become scattered and the stragglers attacked. Third, the apron helped keep the enemy planes at a level above 10,000 feet, making it easier for Home Defence fighters to locate the raiders. Ashmore wrote, "The enemy were induced to fly in the narrow range of heights between the aprons and the ceiling of their machines. Our aeroplane patrols had only to watch that comparatively narrow zone, and the main difficulty of the defence—the difficulty of getting contact with the enemy machines—was reduced."[64] Forced to fly above a 10,000 foot apron the Gotha bomber, with a ceiling of 12,000-13,000 feet, would be much easier for British planes to locate. For areas of London that did not have balloon aprons by the end of 1917, defense planes patrolled at various heights, 8,000, 9,000, 10,000 feet etc., to increase the chance

[62]Raleigh, 68.

[63]Ashmore, 56.

[64]Ibid.

of meeting and thwarting the enemy bombers.[65]

London sustained five bomber attacks from 24 September and 1 October. During these raids the barrage seemed to make a noticeable difference by deflecting the planes away from the capital. The Germans started sending the enormous Giants or R-planes against London during this spate of attacks but with little effect. On 26 September, the Times (London) gave a detailed description of the barrages success on the enemy planes,

> The gunfire at times intense, and as many as ten shells could be counted bursting in the air within the space of five seconds . . . even though no good targets are seen by the gunners, such fire is calculated to have a good effect, for it acts very much like a vertical barrage and keeps the raiders at a height from which they are unable to see their targets clearly . . . so then is the anti-aircraft fire designed to keep the raiding machine within the confines of the upper air. That it does this effectively is fully evident when one looks at the damage that has been caused . . . it is plain that the bombs are dropped haphazard and whenever opportunity offers.[66]

Despite the praise the AA barrages received, drawbacks existed in this method of air defense. The constant firing required during a barrage wore down AA guns and expended a large number of shells. The War Cabinet mentioned in a 2 October meeting that it was because of possibly wearing down guns that the guns facing the 1 October raid were fired less frequently. The War Cabinet also stated that, "already some guns were worn out and had to be replaced, and that if the raids continued on the scale of the last week it was only a matter of a few months before the gun defences of the metropolis

[65]Ibid., 75.

[66]"Intense Gunfire on the Raiders," Times (London), 26 September 1917, p. 6-7, col. 5-6.

ceased to exist."[67] So while the Times (London) could report that the wall of shell bursts seemed impenetrable, and "the task of the enemy pilots was rather like that set a footballer who tries to run through the whole of an opposing team, first trying one side of the ground and then the other, each time being met by the backs of the other side,"[68] the ground guns again faced a shortage of effective guns and shells. Commander Rawlinson recalled the results of firing hundreds of shells per gun during a barrage, writing that the barrels glowed bright red and had to cease firing while water could be poured on the sizzling muzzle.[69] Rawlinson also remembered the crews routine the day following a long night raid: "all hands were busily employed all next day in making good the damage, replenishing the magazines, binding up burnt hands, etc."[70]

To avert having the defense guns regressing into shortages and dilapidated guns, the War Office provided 30,000 rounds per month and a stockpile of 100,000 shells, while the Ministry of Munitions attempted to refurbish 20 guns a month for Ashmore's defenses.[71] Ashmore was also pleased to learn that the Admiralty would soon give the Home Defence sixteen AA guns previously destined to protect merchant ships.[72]

[67]Cab. 23/4 (243), "Minutes of a Meeting of the War Cabinet," 2 October 1917.

[68]"The Barrage at Work," Times (London), 1 October 1917, p. 10, Col. 2.

[69]Rawlinson, 209.

[70]Ibid., 212.

[71]Ashmore, 62.

[72]Cab. 23/4 (246), "Minutes of a Meeting of the War Cabinet," 8 October 1917.

Ashmore realized the increased effectiveness of the barrages but still demanded more from them.

The last Zeppelin raid against London, which soon became known as the "silent raid", occurred on 19 November 1917. That even part of this raid took place over London was purely an accident. The Germans planned to attack the towns of central England but gale force winds existed in the lofty heights now used by the height climbing airships and the eleven raiders were blown off course. But of the eleven Zeppelins only L45 actually bombed London, leaving thirty-four dead and wounding forty-nine.[73] Captain Kölle commanded L45 on the night of 19 October and recalled the effects of the weather, "Never had the weather played us such an evil trick. When we reached England some time in the evening a gale got up and set our ship creaking in every joint. The howling north wind was giving us a strong drift to southward; we intended to bomb Sheffield, but eventually found ourselves over London."[74]

Misty conditions rendered the London searchlights useless and commanders in that city ordered crews to not use their lights to help conceal the capital. The bombs dropped by L45 were an attempt to rouse the defenses from their inactivity and thereby help the Zeppelins gain their bearings. L45 did not even know they were directly over London at the time. Some of the airships separated by the winds attacked other towns north of London but the damage was relatively small. London's defense was essentially powerless against the Zeppelins flying too high to be seen or heard. Four other airships

[73]Hogg, 58.

[74]Marben, 82.

were in the vicinity of London with L45 but only four of the seventy-three defense planes in the air could even catch a brief glance at the airships and the glimpses were enough for the pilots to realize the enemy was out of reach.[75] London and the other targets in England were lucky to receive so little damage from the unseen enemy. The real furor in England came in Parliament and in the press where questions abounded over why the defense was caught asleep.

L41, L46, L47, L53 and L54 landed safely at their home bases, but the remaining raiders met less fortunate fates. While approaching England for the attack, many of the Zeppelins and their crews suffered from the freezing cold and lassitude caused by the incredible heights of the airships. The men neglected their duties and engines failed making the return journey more difficult. L45 and L49 were forced down in France and both airship's crews were taken prisoner. L55 was badly damaged during its crash landing while L50 landed roughly in Dammartin France but only long enough for sixteen of the twenty member crew to escape the craft before a gust of wind tore the damaged airship from the ground and vanished over the Mediterranean Sea with its remaining four members.[76]

Before crash landing, the crews of L49 and L50 were following L44 commanded by Franz Stabbert. They were able to witness L44 as French AA guns fired at it and finally brought the airship down in flames by a French plane.[77] The German airship

[75]Ashmore, 67.

[76]Ibid, 390-91.

[77]Lehmann, Zeppelin, 183.

service started the 19 October raid with much promise, but in addition to inflicting relatively little damage on England, the night ended in disaster for five of the eleven ships which left their sheds in Germany that night were lost.

Members of Parliament and the press quickly began to question why the guns did not fire at the enemy airships and the apparent ineffectiveness of the air defense. On 22 October MP Sir F. Lowe began a discussion of the 19 October raid which became a heated dispute and brought into question the state of London's air defense. Lowe pointed out that he realized that the German raid ended in failure, but asked why the guns did not fire on the enemy when the barrage had seemed to be working well.[78] Joynson-Hicks also asked what had become of the defense during the recent raid and criticized the government for promising the House and the citizens of London a flawless air defense system, he asserted, "The general impression of the people of the city of London on Friday night was that on no previous occasion was the defence of the City against air raids so helpless."[79] Joynson-Hicks proceeded to say that, "no guns were fired . . . no attempt was made to bring them down."[80] This statement was only partially true. The guns were silent only because they could not see the enemy in the mist and at such great heights. The AA guns could not match the ceiling of the new type of airships. As for the planes, Major-General Ashmore reported that over seventy machines ascended to attack but, like the ground guns, they could not reach the enemy. Four of the Home Defence

[78]Parliamentary Debates (Commons), 5th ser., vol. 98, (1917), col. 590.

[79]Ibid., col. 598.

[80]Ibid.

planes actually crashed the night of the "silent raid."[81]

MP Dillon stated that while the raids produced no direct military effect, the prestige of the capital city suffered at the hands of the enemy's bombs. He did not blame the defense forces for the poor showing but claimed the true fault "lies in the gross mismanagement and over-lapping of the various machinery controlling the air service of this country."[82] MP Chamberlain rose to defend the government by saying that when an attack on the western front is not successfully defended the House does not seek "which minister we are to hang."[83] He also told the House that no form of defense was impregnable against this type of warfare. Looked at in its entirety the air defense of London was much improved.[84] Admiral Hedgeworth Meux rose to disagree. He believed, as did others in the military and the government at the time, that the barrage was a waste of time and related it to an event he witnessed while on a trip to the river Yang-tse-Kiang in China. Meux told the House,

> There was an eclipse coming on. We saw something rather amusing . . . the moon was gradually becoming obscured. There was a tremendous performance all round. Tom-toms were beaten and crackers were let off. As the eclipse came to its finish and the moon cleared there was general rejoicing, because the people thought that by their crackers and by their tom-toms they had driven away the devil from the moon. Our barrage is just as much use, and the sooner we leave it off the better. I do not know any military man who really believes in it.[85]

[81]Ashmore, 164.

[82]Parliamentary Debates (Commons), 5th ser., vol. 98, (1917), col. 601.

[83]Ibid., col. 602.

[84]Ibid., col. 603.

[85]Ibid., col. 604.

Others questioned the effectiveness of the barrage too. Noel Pemberton-Billing said that the gun barrage over London would "be looked back upon as one of the humours of this war."[86]

Chancellor of the Exchequer and head of the Conservative Party Anthony Bonar Law stood to defend the government. He agreed with Chamberlain that no system of air defense was fool proof. He said, "All you can possibly do is to make them as dangerous as you can to the enemy, and that I venture to say we have done and are doing."[87] Pemberton-Billing was known for his scathing criticism of the government's air policies and was a vehement proponent for reprisals against Germany. He used the 22 October discussion to attack the defense of London and place blame again before the government's feet. He stated that the defense was, "a chaotic muddle, and it has been from the beginning . . . the defence of London is a disgrace to the government, and . . . the people of this country will not stand it very much longer. They are not going to live in tubes while Ministers loll on benches."[88] Bonar Law had already dismissed Pemberton-Billing as the member who thought "he is the only person who can defend London, and he is in fact the only man in England who does think so."[89]

[86]Ibid., col. 615.

[87]Ibid., col. 609.

[88]Ibid., col. 616.

[89]Ibid., col. 610.

On the same day Major-General Ashmore provided the facts of the raid to the War Cabinet. He told them that only one Zeppelin made its way across the skies of London and that the foggy conditions on the ground made the use of searchlights futile. The great height of the airships rendered impotent the British fighter planes that went up to engage the enemy because no British plane was available to attain heights of 16,000 to 17,000 feet. The French guns and pilots were able to attack properly the enemy airships because the Zeppelins were flying by that time in daylight, at lower altitudes and in clearer weather conditions.[90]

The "Silent Raid" ended in disaster for the Germans when their Zeppelins suffered at the debilitating heights to which the London defense forces had driven them. The raid could have been a catastrophe for London since the airships achieved their initial goal of reaching their targets virtually undetectable and keeping themselves out of reach of the guns, searchlights and planes of the London defense. Rawlinson realized how impotent the defenses were against height climbing Zeppelins and was gravely concerned. "The defence was powerless," he wrote "to offer any resistance at all to an attack delivered in silence from so high an altitude."[91] Such heights, however, were not conducive to successful, concentrated attacks.

Major-General Ashmore was pleased with the positive effects of the gun barrages but became disappointed that more planes were not shot down outright by the gun fire. F. O. Oliver witnessed the London raids and also believed the barrage should have been

[90]Cab. 23/4 (254), "Minutes of a Meeting of the War Cabinet," 22 October 1917.

[91]Rawlinson, 222-3.

more lethal to the enemy. Oliver wrote to his brother, "there seems to be no way of hitting back. Our tremendous barrage so far seems to have frightened them; but there is no permanent good in frightening if you don't hurt; in the end that only means that you will cease to frighten and they will come on."[92] Yet each raid seemed to provide proof that the barrage posed a serious threat to the approaching raiders and continued to bust the formations and even downed a few planes. Following a 31 October raid, in which approximately twenty-four planes attacked, Ashmore could write, "the majority turned off in face of the barrage fire, and the eight that may be said to have got well over London itself, were so harassed by the barrage fire of the inner defences that they dropped all their bombs in outlying districts, where the casualties only amounted to nine killed and nineteen wounded."[93]

On 29 October the War Committee continued their war-long debate over whether to give guns to merchant ships or the London AA defense. Lord French stated that twenty-four guns were needed to fill gaps in London's defense and to intensify certain sections of the barrage. The War Cabinet decided not to provide L. A. D. A. with the Admiralty's guns since the familiar question of remounting the guns would take about five months to complete.[94] Later in the meeting Winston Churchill, then Minister of Munitions, stated that he was "not himself a great believer in the efficacy of the barrage system of defence against air raids."[95]

[92]Gwynn, 309.

[93]Ashmore, 71.

[94]Cab. 23/4 (259), "Minutes of a Meeting of the War Cabinet," 29 October 1917.

[95]Ibid.

But the barrage continued to prove its worth during the next bomber raid on 6 December when around fifteen Gothas and one Giant attacked England. While thirty-four planes went up in defense, only the guns were successful, bringing down two Gothas outside London.[96] Ashmore claimed that a third machine dropped into the sea on its return voyage and that this may have occurred because of being damaged by AA fire over England.[97] On 18 December five waves of bombers attacked London for the last time in 1917. Commander Rawlinson recalled that the barrage and lights drove away the first two divisions of attackers while the third, fourth and fifth waves were thoroughly scattered by the barrage and all enemy bombs were dropped outside London.[98]

Another important event which took place towards the end of 1917 was the creation of an Air Ministry which combined the army's Royal Flying Corps and Admiralty's Royal Naval Air Service under one service. The creation of an Air Ministry, made into law 29 November 1917, had been called for, often heatedly, throughout the war. Prime Minister Lloyd George wrote in his memoirs about the damaging effects of having two air services, "The two air services . . . were competing with each other for the available supplies of aero engines . . . competing rather than pooling their experiments and inventions in regard to technical improvements . . . the net result of this division of responsibility for our flying services was overlapping, inefficiency, and a seriously swelling casualty list."[99] But the Air Ministry progressed slowly, and even by late

[96]"Gunners' Success in the Last Air Raid," Times (London), 15 December 1917, p. 6, Col. 1.

[97]Ashmore, 72.

[98]Rawlinson, 231-2.

[99]Lloyd George, Vol. IV, 1847-8.

February the next year the ministry was piecing together "the detailed arrangement for the actual transfer of the Royal Naval Air Service and the Royal Flying Corps. It was agreed that the transfer should take place gradually."[100]

MP Harcourt brought up in the 16 November 1917 parliamentary discussion on the Air Force bill the question of AA guns under the proposed new air service. Harcourt said he believed the gun units had endured more problems at the hands of divided control than the air services and that the gun defense needed to be unified and well coordinated. Unfortunately, few in the House attended the meeting on AA organization. This prompted General Sir Ivor Phillips to inquire, "The other day when the enemy were chucking half a dozen bombs on London, and this very Anti-aircraft organisation which we are now discussing was hurling tons of steel into the Heavens, down came all the London Members, weeping and gnashing their teeth because they were not being protected, and they were not satisfied with this organisation. Where are they to-day?"[101] Major-General Ashmore claimed the Air Ministry had no effect on air defense because, regardless of new administration, the aprons and planes for Home Defence still came to the commander of Home Defence to be distributed.[102]

During the last year of the war, London endured only six more attacks with the last occurring 19 May. But the new year began with a serious blow to the moribund Zeppelin service. In January 1918 the German Naval Air Service had fourteen Zeppelins

[100]Parliamentary Debates (Commons), 5th Ser., Vol. 103, (1918), col. 958.

[101]Ibid., vol. 99, (1917), col. 760.

[102]Ashmore, 78.

left, but on 5 January explosions and fire swept through the sheds at the large Ahlhorn airship base. Four new Zeppelins and an older army SL model were all destroyed. While the official report claimed that the shed fires were accidental, this explanation was not accepted by Ernst Lehmann. "The circumstances of the catastrophe indicated sabotage," Lehmann wrote, "both double-hangars were 200 feet apart, and the single hangar was half a mile away from the others. In view of the swift sequence of explosions, a spreading of the fire was out of the question."[103] Whether the accident was caused by sabotage or accidental fire the fact remained that the Zeppelins were all but finished.

Although the British expected a return of the Zeppelins, their greatest fear remained with the threat of bomber strikes. Some in the War Cabinet believed that the Germans might attack with 5oo bomber planes, "which might result in a conflagration with which the Fire Brigade might be unable to cope."[104] Most in the War Cabinet dismissed the thought as unlikely.

Changes among some of the ground crews occurred during this time. Major-General Ashmore had to dismiss the part-time volunteers who had been manning many of the searchlights, replacing them with men who could provide full-time training and service. MP Chancellor brought up the plight of the dismissed men in Parliament whom, he said, wished to continue their service until the war's conclusion. Parliamentary Under-Secretary of State Ian Macpherson stated that the men gave only a third of their time and that "Recent developments in searchlight training have necessitated a higher

[103]Lehmann, Zeppelin, 210.

[104]Cab. 23/5 (320), "Minutes of a Meeting of the War Cabinet," 11 January 1918.

degree of training and efficiency, which can only be achieved by whole-time men."[105]

Commander Rawlinson's AA sector continued to be depleted of crewmen as men who were once deemed unfit for battle were being accepted to fight on the western front. The replacements Rawlinson received were less than desirable and were believed by Rawlinson to be almost untrainable. The commander in some of his notes recalled examples of mistakes made by his lackluster crews. "A 'deaf' ammunition number supplied two rounds of wrong ammunition at a critical moment before his mistake was discovered . . . Casualty to No. 7 of the gun's crew, who 'placed his hand in the breech of the gun instead of the shell.' Bones broken. Mentally deficient!"[106] Rawlinson had had enough and knowing that his immediate superior, Anti-Aircraft Defence Commander Colonel Simon, was less than fond of Rawlinson's independent nature, Commander Rawlinson turned in his resignation. "Owing to the constant changes of personnel and the consequent inexperience throughout," he said, "I feel that I am unable to undertake the responsibility of ensuring the efficiency of the unit."[107] Rawlinson's last day of service was 16 February 1918, and he was ecstatic when on the same night, as he lay in bed, an air raid commenced and he was no longer in charge. "The deaf, the blind, and the mentally deficient," he wrote, "could now commit every kind of possible and impossible enormity, but I could go to sleep."[108]

[105]Parliamentary Debates (Commons), 5th Ser., Vol. 101, (1918), Col. 974.

[106]Rawlinson, 241.

[107]Ibid., 237.

[108]Ibid., 242.

Despite losing one of its most able and loyal leaders the London air defense continued to progress. The following chart shows the numbers of guns and searchlights available at the beginning of 1918 and by April of the same year.

1918	guns	searchlights
January	249	323
April	266	353

SOURCE: Data from E. B. Ashmore, Air Defence (London: Longman's, Green and Co., 1929), 79.

The airplane factories were also churning out more planes than in previous years. Minister of Munitions Winston Churchill told the War Cabinet on 7 March 1918 that Britain produced 211 planes in 1914, 6,099 in 1916 and 14,168 in the previous year. Churchill also stated that the estimated production for the next month alone was 2,747 aircraft.[109] Despite the massive increase in plane production, Home Defence possessed only 159 day fighters and 123 night flying aircraft. The numbers actually pleased Ashmore but he was less pleased with the number of pilots that actually saw enemy planes while defending the skies of London. "Out of every eighteen of our pilots that went up in defence, seventeen saw nothing of the enemy."[110] Ashmore focused on better communication between pilots and ground forces for the rest of the war.

London's defense had been able to use wireless communication in a few planes as early as 1917. The few planes equipped with wireless were labeled as 'trackers,' and would trail behind the attacking German squadrons to report the direction and height of

[109]Cab. 23/5 (361), "Minutes of a Meeting of the War Cabinet," 7 March 1918.

[110]Ashmore, 83.

the bombers. The trackers could also report the effectiveness of the AA fire.[111] The fact Ashmore did not discuss how effective wireless was in 1917, and the fact that the Home Defence was still experimenting with it in April 1918, may provide evidence that the tracker system did not work well in 1917. But wireless communication seemed to progress well by 1918. Pilot Cecil Lewis remembered the results of wireless tests in 1918, "We tried to speak, not very successfully, from machine to machine. But to speak to the ground was very easy."[112]

Imaginations ran wild in London. The British were concerned about sinister attempts by the Germans to release poisonous bombs on the city.[113] In February rumors that the German pilots were dropping poisoned candy on London were taken seriously enough for MP Gilbert to bring up the question in Parliament.[114] No evidence of such activity could ever be proved.

The Germans carried out the last bomber raid against London on 19 May 1918. But like the Last Zeppelin attack against the capital, the raid ended poorly for the Germans. Of the thirty-three planes that attacked only thirteen actually arrived over London. The enemy lost a total of ten planes during the raid: three were shot down by English fighters, three were brought down by AA guns, one suffered engine trouble and landed on English soil and three crashed in Belgium.[115]

[111]Ibid, 42.

[112]Lewis, 240.

[113]Cab. 23/6 (411), "Minutes of a Meeting of the War Cabinet," 14 May 1918.

[114]Parliamentary Debates (Commons), 5th Ser., Vol. 103, (1918), Col. 1101.

[115]Ashmore, 86.

London never witnessed another attack by air for the rest of the war. Zeppelins continued to be lost elsewhere. L59 and L62 exploded mysteriously in April and May 1918 respectively. Two more airships were lost in their sheds at Tondern during a British air attack with planes launched from the aircraft carrier *Furious.*[116] During the 7 August War Cabinet meeting an abortive raid against England by five Zeppelins was briefly reported. Before turning back because of adverse weather conditions "one Zeppelin had come down in flames."[117] This otherwise innocuous sentence did not offer the more serious fact that on board airship L70 was the leader of the German Naval Airship Service, Peter Strasser. Strasser was aboard the newest type Zeppelin when a British Airco D. H. 4, with an increased maximum ceiling and piloted by Major Cadbury and Captain Leckie, brought down the airship with incendiary bullets off the Norfolk coast. The Zeppelin service was finished. Ashmore wrote, 'The loss of Strasser was a severe blow to the Naval Airship Service. He had been its guiding genius all through the war,"[118]

London's air defense finally coalesced after the final German air raid. All planes had wireless capabilities by May 1918 and the complex telephone network required for communication on the ground was finally completed on 12 September, four months after the last raid and two months before the war's conclusion. Ashmore described the London Air Defence Area as, "a highly centralized intelligence and command system. A deep

[116]Lehmann, Zeppelin, 212-14.

[117]Cab. 23/7 (455), "Minutes of a Meeting of the War Cabinet," 7 August 1918.

[118]Ashmore, 91.

zone of country surrounding London, and extending to the sea on the south-east and east,"[119] Every facet of the defense system: gun stations, searchlights, coastal observation posts and airfields, served as an observations post. Each of these posts were connected to a sub-control, of which, twenty-five existed. Each sub-control was connected to the central control located at the Horse Gaurds in London. At the central command a large map with squared grids was placed on a table with up to ten 'plotters' standing around it wearing headsets to receive the sub-controls information. As the plotters received information of enemy aircraft from the sub-controls they moved colored pieces, which represented the enemy bombers, along the appropriate spot on the map. E. B. Ashmore and the Air Force Commander Brigadier-General T. C. R. Higgins stood looking down from a balcony at events as they transpired on the map during a raid. Ashmore had lines of communication with each sub-control and Higgins had direct contact with squadrons of fighter planes at his disposal. Ashmore even had contact with the Speaker of the House in Parliament via a phone line behind the latter's chair.[120] Although the L. A. D. A. finally gelled in the later months of the war, Ashmore developed the system, to various degrees of success, since he accepted the post as leader of the London air defenses.

[119]Ibid., 92.

[120]Ibid., 93-95.

Conclusion

The German air attacks against London and the rest of England during the First World War sought to severely disrupt the production of war materials and lines of supply and force the British to send men and supplies away from the front. Each of these goals were attained only on a very minor scale. The English people, while often flooding the tube with hundreds of thousands of people, never broke into a wild panic that would lead them to ask their government for peace. Instead, the British people became more resolved to stand up to the attacks and public outcry spurred the government to quicker action in defending the nation. The raids may have been useful as a recruiting tool. As one English officer stated, "They arouse such anger that the enlistments increase by leaps and bounds on the days following."[1] While thousands of men were required to man the defense system, most were over draft age, and many were either mentally or physically handicapped and would not be used at the front anyway. Nor should it be overlooked that thousands of German workers and considerable supplies were used building and maintaining the numerous airship bases. Ernst A. Lehmann, who perished 6 May 1937 commanding the *Hindenburg*, wrote of the numbers of workers used at one large base in 1918: "Friedrichshafen was operating at full capacity; at the Zeppelin docks where, at the turn of the century, only Dürr and a few others had been employed, there were now 1,600 technicians and mechanics and 12,000 men and women working in day and night shifts."[2]

[1]Charles Stiénon, "The Zeppelin Raids and Their Effect on England," Current History, (May 1917), 333.

[2]Lehmann, Zeppelin, 213.

The Germans could claim the raids tied down hundreds of planes, guns and searchlights in England that could have been used in more important fighting fronts, and factory output at times could be curtailed, but overall the raids produced less than impressive results. The Zeppelins could not be very accurate from such heights and often dropped their bombs when and where they could. During a C. I. D. meeting on 14 July 1910, then Secretary of State for War R. B. Haldane said that he had learned that the Germans were acquiring methods for accurate bombing "to enable these bombs to be dropped down the funnels of war-ships, which funnels were now as large as 20 feet in diameter."[3] One wonders where Haldane acquired his information. But thankfully for the English, this type of accuracy never occurred.

Much of the credit for the poor performance of the enemy attackers could be claimed by the Home Defence. But other factors contributed greatly to the middling German results. The German airships and bomber planes never achieved large enough numbers to attack England often. Also, both types of aircraft had to compromise bomb tonnage to carry extra fuel to make the long trip to London and back. Airships particularly were hampered by bad weather and would often attack only during beneficial cycles of the moon that provided the least light.

Although the plane defense was the more glamorous aspect of Home Defence and once provided with incendiary bullets, the real turning point against the airship threat, the anti-aircraft guns were effective in many ways. First, the AA guns provided visible and

[3]Cab. 38/16/12, "Committee of Imperial Defence," 14 July 1910.

tangible evidence to the public that the military was providing protection for them. Second, even if the guns did not strike an enemy Zeppelin or airplane, the shell bursts would provide defending pilots, who usually found the enemy by luck, with some idea of where the raiders were located. Third, even though a direct hit by a gun shell would not send an airship burning to the ground, and airships could take considerable damage and still remain in the sky, the AA gun damage aided the defense. The Zeppelins used during the war contained fourteen to nineteen large gas cells which held the gas that kept them flying. When these cells were holed or ruptured by shells, the escaping gas would make the airship sink or unable to rise to its maximum height. This made it easier for other guns or planes to reach the airship and damage it further. Shell splinters could destroy motors making the invader slower and therefore easier for planes to pursue and overcome. Gas released into the ship could make the aerostats machine gunners stop firing for fear of causing a spark that would result in a fire raging through the ship's body. Fourth, once enough anti-aircraft guns could be assembled to create a barrage, the wall of shell bursts produced proved very beneficial in keeping the raiders above a certain height making it easier for Home Defense planes to locate and engage the enemy. Also, once enough guns could be massed in certain sections of London, Zeppelin commanders learned which areas were too powerfully defended and would avoid those places entirely. Fifth, ground guns were very effective in breaking up the bomber planes as they approached in formation, thereby making it easier for pilots to engage solitary planes separated from the pack. While anti-aircraft guns could sometimes bring down an airship

by itself, the damage inflicted by the guns proved much more effective against the more vulnerable airplanes.

The defense guns experienced many problems during the war. Even though the British were aware before the war of the threat airships posed against England, and did muster some guns and created the Royal Flying Corps in 1912, they started the war with hardly any defense against the attackers. Many of the guns the British could obtain had poor sights, not enough ammunition, untrained crews and had a range that would not fire a shell to the height the Zeppelins were flying. A war-long competition for guns existed between the Home Defence and the merchant ships of the Admiralty and difficult mountings for AA guns hindered the rapid production of guns. Some may be unimpressed with the amount of planes and blimps downed by AA guns, but as Major-General Ashmore wrote, "the anti-aircraft gunner of the war time had to work with the crudest instruments, or without instruments altogether, it seems amazing not that the bag was small, but that there was any bag at all."[4]

While the sources vary on exact numbers, E. B. Ashmore claimed the damage inflicted on London alone amounted to £2,042,000 and that the capital suffered 541 deaths.[5] All of Great Britain sustained 1,414 deaths and 3,416 casualties.[6] Some of the

[4]Ashmore, 98.

[5]Ibid., 106.

[6]Fredette, 262.

raids against London resulted in a heavy loss of life and property, but they never became the nightmare that Admiral of the Fleet Lord Fisher envisioned. According to David Lloyd George, Fisher believed Zeppelins anticipated, "the gruesome spectacle of a ton of explosives dropped from the clouds on the Horse Guards Parade, and destroying in one shattering explosion all the historic buildings surrounding that square, with the Admirals, Generals, Statesmen, and Civil Servants under the ruins 'in one red burial blent.'"[7] The airships of the naval air service were usually used for attacks on England while the army airships more often attacked Russia and France. The German navy used 78 airships during the war and of these 52 were lost, and with them 436 crewmen.[8]

Within two years of the armistice the entire defense system of England vanished, despite the advice of men like Rawlinson and Ashmore that the defenses should remain. Ashmore blamed the lack of interest in maintaining the defense on war weariness and Rawlinson claimed it was "our national failings—that is, our conservatism and our reluctance to accept new conditions."[9]

England, and the other countries of the world, now faced an entirely new type of warfare that progressed rapidly throughout the war. Cecil Lewis correctly assessed the situation since aircraft were introduced as weapons of war: "Frontiers were gone. Security was gone."[10] Michael MacDonagh too realized the significance of the air age,

[7]Lloyd George, Vol. IV, 1846.

[8]Lehmann, Zeppelin, 217.

[9]Rawlinson, 250-51.

[10]Lewis, 185.

asserting that, "Pain and death are brought to us now by a new agency which only a few years ago—before the War—would have appeared too fantastic ever to have entered the mind of anyone—save, perhaps, a writer of creepy-crawly stories."[11]

Nonetheless the defense system fought over and pieced together to effectiveness during the war disappeared. The study of London's air defense during the First World War is important in showing how a great power coped with the new challenges which twentieth century warfare presented. Though the effort was at times disjointed, quarrelsome, plodding and inefficient, it provided in the end a menacing bastion for any enemy aircraft. The efforts of London's Home Defence also provided the Second World War with something the First World War had not: a precedent. As for Major-General E. B. Ashmore, the man who made the London air and ground defense a cohesive unit, he knew England had made itself unprepared for the next war, just as it had been unprepared for the last, by dismantling all of its guns and searchlights after the conflict ended. He wrote at the end of his book, "that we are exceptionally vulnerable in air attack has been proved. If we maintain an efficient air defence, we may never be attacked; if we have no air defence . . ."[12]

[11]MacDonagh, 258.

[12]Ashmore, 155.

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