

AIR FACTS AND PROBLEMS

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PREFACE

ENTHUSIASTS are apt to claim too much for aviation and, as a witty airman has remarked, to fly before they can walk and to talk before they can fly. No one appreciates such jests more than the pioneers of aviation, and the famous airmen who to-day are carrying on their work. Their achievements are facts which need no furbishing. The purpose of this book has been to put certain facts before the reader and to indicate the problems which arise from them. For the facts the writer has gone to the most authoritative sources of information; and much light has been shed on several of the problems by Mr. J. M. Spaight in his book *Air Power and War Rights*, to which reference is made in Chapter III.

Chapters I, II, III, IV, VI, VIII, IX, XI, XII, XIII, XV and XVI are amended versions of twelve articles written for the *Chicago Daily News*. Chapter XIV is a digest of three articles which have been published in *The Observer*, and an article in *Airways*.

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AIR FACTS AND PROBLEMS

CHAPTER I

INTRODUCTORY

THE writer of this book was a soldier during the first twenty-six years of his adult life—from March, 1894, to September, 1919. As such he shared the prejudices of most Army and Navy officers against new-fangled ideas, more especially in their application to the art of war. For the first twenty years of his military career, during which he took part in four wars, warfare to him was simply fighting, an encounter between armed men; and the whole object of strategy and tactics was to put armies in the most favourable posture to fire off cannon, shoot with rifles, and, finally, to charge the enemy on foot and horseback. He had sympathized with those who went up in balloons at Ladysmith, had witnessed and reported on experiments with kites, and had heard about the German Zeppelins. But these appliances were in his view little more than toys, which might, conceivably, at a distant date, serve

some useful purpose, but were, from their very nature, likely to remain the material for stunts.

Then came the World War, and, in the course of many wanderings, he was bombed by German airplanes in London, Paris, on the Western Front, and narrowly escaped being blown to pieces in Bukarest. Moreover, and this at first to him was even more alarming, as a Staff Officer he was compelled on more than one occasion to fly himself. Under the pressure of experience, later than some far-sighted men, but sooner, unfortunately, than many professional soldiers, he came to realize that Aviation would transform the character of warfare. Even in these early days, it needed no special power of imagination to foresee that prodigious developments would ensue, that the range and carrying capacity of airplanes would be increased, that these swift and terrible weapons would render possible unlimited destruction of civilian life and property, at the heart of any belligerent State within striking distance by air of an enemy with an Air Force.

When the War reached its close, all the belligerents had large Air Forces, whose tactical and strategical value would have been more fully illustrated if hostilities had been prolonged. Nothing has been more striking since the Armistice than the development of air power. Air Forces are now recognized as the first lines

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of offence and defence in all countries which possess them, and few do not. Their co-operation is indispensable with modern fleets and armies; in regions like Arabia they have proved to be an effective and economical substitute for land forces. Each year adds to the range and capacity of airplanes. Already few European cities are immune from air attack. Where the soldiers of Napoleon passed, in 1812, after many weary marches, a fleet of airplanes can now pass in a few hours. From London to Moscow is a two-day flight.

America is still immune from air raids. But in course of time, ten years perhaps, airships will cross over the Atlantic in seventy hours. These great aerial liners will be built, primarily, for the transportation of passengers and troops, but they may also serve as aircraft carriers, and thus extend the range of air attack to several thousand miles. In these circumstances, the authorities in Washington will be faced with a new problem of defence, whose solution may require a different system to that which meets the actual situation.

There is another side to aviation, which will make a wider appeal than its purely military application. Out of evil good has come. The world-war gave to this new form of locomotion an impulse and a financial sustenance which would have been lacking in normal times. Thousands of young men learned to fly from

patriotic motives ; millions were spent on aircraft, which would have remained in the taxpayers' pockets ; inventions were encouraged, and inventors were thereby stimulated to fresh efforts ; the pioneers of the aircraft industry reaped a golden harvest, the just reward of patient perseverance before the war. And so the development of civil aviation was advanced by at least twenty years.

Unfortunately, though not unnaturally, this rapid development created an artificial situation which needs adjustment. The task before this generation is to organize aviation, and make it the factor that it should be in a national and international sense. For various reasons, this task will have to be approached on different lines to those associated with either the administration of a fighting service, or the building up of an industry whose growth has been less sudden and which has developed slowly with its markets.

The position may be stated briefly : if private enterprise is discouraged, the airplane will remain for an indefinite period chiefly an instrument of war ; on the other hand, if the development of aviation for civilian purposes is uncontrolled, one of the greatest of man's achievements will be exploited for purely money-making purposes, and the patient research that is required may be scamped by promoters in a hurry to make profits. A just

admixture of State direction with private enterprise and initiative is needed to cope with this new element in our civilization, whose possibilities both in war and peace are so immense.

That people can and will acquire the habit of the air there is little doubt. The practical utility and advantages of Aviation for defence, business and pleasure travel, have only to be known to be appreciated by the public in all lands. The principal deterrents hitherto have been fear of accidents and expense. Though natural enough, the first of these has been exaggerated; it always is in regard to innovations, and is felt by the most highly placed and distinguished people. The reading public in Great Britain have been reminded recently, that during the first ten years of her reign, Queen Victoria refused to travel in a train, from fear of accidents. She was finally persuaded to run the risk by the Prince Consort, who, himself, seldom left the railway station without admonishing the engine driver for having gone too fast. In this kind of fear, imagination plays a larger part than fact. If statistics were any guide, those for the past year would show that flying is far safer than travelling by rail in France. The perils of motoring are too well known to need mention; no particular horror is excited by the fact that 25,000 people were killed in motor accidents last year in the United States. These dangers apparently do not matter

because they are familiar, and on the ground. But whenever an airplane accident occurs, it is regarded by the nervous as one more nail in the coffin of aviation and given the widest publicity. And since the vast majority of accidents take place during the training of military aviators, the public are misled into imagining that they will be exposed to the same risks as these young men. Of course this is far from being the case. The comparison between military and civil aviation, so far as risks are concerned, is about the same as that between steeplechasing and riding a well-mannered hack in Rotten Row, or between travelling on the *Mauretania* and going down in a submarine.

Nevertheless, aviation can be and is being made safer. New devices are continually being introduced to prevent mishaps due to engine failure; others increase stability and so simplify control as to make the latest machines almost fool-proof. Great progress has been made in these directions during the last two years. The inventions of the Spanish engineer, Señor de la Cierva,¹ and of Captain Hill,² are as remarkable innovations as the airplanes of 1910. When the latter were first seen in public, few would have ventured to predict that from them would be developed an airplane which could make a non-stop flight of over 3,000 miles. The former

¹ The Autogyro.

² The Pterodactyl.

were seen at Hendon, last summer, by 80,000 people, and only ingrained scoffers and fanatics for speed remained unconvinced of the great future that awaits these quaint-looking and ingenious machines.

There remains the question of expense. Airplanes will have to become cheaper as well as safer. So far, these machines have fought their way along by the force of a high-powered engine; as a consequence, they are costly mechanical contrivances with running costs proportionately high. But now, light airplanes are being manufactured with low-powered engines, whose initial cost is little more than that of a medium motor-car, and whose running costs should not exceed those of a motor-cycle. These should attract the private owner, both for business purposes and sport. At the same time, a large type of airplane has been constructed which may be described as an aerial char-à-banc. This type will materially reduce the expense of air travel, and bring it within the reach of people with quite moderate means.

When Aviation has been rendered safe, it will become more popular, and therefore cheaper. The pilot will cease to be regarded as a hero of romance, endowed with mechanical genius; air travellers will not preen themselves on being high-spirited adventurers. People will get into an airplane as they now take a bus, and air transport will begin to be not only a commer-

cial proposition, but also this means of locomotion will put the aircraft industry on its feet and give employment to thousands of pilots and mechanics.

A long series of disasters to airships has, until quite recently, discouraged the public and the constructors of these vessels. It must be remembered, however, that lighter than air machines are indispensable for the final conquest of that element. Elaborate experiments are now being carried out, both in Great Britain and America, whose object is to ascertain the causes of failure in airships like the "Shenandoah." The results of these experiments are being embodied in a new type of airship, in whose construction "Safety First" has been the dominant consideration. That success will attend these efforts there is little doubt. When trustworthy lighter than air vessels are available, their uses for defence, passenger and mail services, business and pleasure travel, will be so manifold and convenient, that air liners plying regularly across continents and oceans, with excursion airships and air yachts cruising round our coasts, will form part of the regular apparatus of civilization.

Each country will make its own contribution to the development of aviation. Progressive peoples will encourage its proper use; reactionaries and disgruntled nations will be tempted to abuse it for purposes of conquest

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or revenge. Hence, many problems will call for solution. They can best be studied from an international angle, for it is in the field of international rivalry and affairs that the most serious questions will arise.

CHAPTER II

AIR WARFARE

FIELD-MARSHAL FOCH has declared: "The potentialities of aircraft attack on a large scale are almost incalculable, but it is clear that such attack, owing to its crushing moral effect on a nation, may impress public opinion to the point of disarming the Government and thus become decisive." Presumably, the word "disarming" in this connection signifies that the Government of a State which had not made adequate provision for air defence might find itself compelled, by its own citizens, to sue for peace before it had had time to bring into action either its fleet or army.

This is a proposition which gives furiously to think; if correctly stated, the implication is that money spent on fleets and armies is wasted, unless security against air attack has been assured. In other words, the Air Forces of the European States are their first lines of defence just as they are the spear-heads of offensive action. Moreover, their functions will, inevitably, be expanded as time goes on. Mobility is the secret of success in warlike operations,

and with the development of aviation, these swift aerial machines must become yet more dominating factors in strategy and tactics.

In these circumstances, the panoply of war will disappear, and much of its expense. A few thousand young pilots and mechanics will steal away unobserved, very probably by night, reach their objective, which may be several hundred miles away, and work more ruin in half an hour than an army corps could in a month. The objective will be either the Capital of the enemy State, or a large railway junction, or a dockyard, or an industrial centre where munitions are being manufactured or airplanes built. In all these cases, civilian life and property will be exposed to air attack. The prospect thus opened up is terrible to contemplate, but it must be faced by every State in Europe. And America, in ten years' time, may not enjoy her present enviable immunity from these perils.

Should such a calamity as another World War occur, hostilities will begin at once, there will be no breathing space of ten days or a fortnight for mobilization. If Aviation had been developed in the year 1914 as it is in 1926, and if the Germans had had at their disposal an Air Force of equal size and competence to that maintained on a peace footing at the present time in France, German airplanes would have been able to attack London by 5 p.m. on August 4, 1914, and to drop a greater weight of

bombs, during that single raid, than was dropped on the whole of Britain during the four years of the World War. Further, it would have been possible to maintain that scale of bombing, day after day, for weeks if not for months. The results would indubitably have been a state of panic among the inhabitants of the localities attacked, unlimited destruction of life and property, the devastation of dockyards, military centres and railway junctions, and the consequent paralysis of mobilization. In these circumstances, the embarkation of the British Expeditionary Force would have been hampered if not prevented, and a number of our warships would have been disabled before they could put to sea.

Against attacks of this description, a purely passive defence is usually ineffective. All parts of the country within range are a target, every point cannot be defended ; surprise is facilitated by darkness or the presence of heavy cloud, even on clear days the sky is too large to defend. These conditions impose special methods, and involve two different forms of air fighting. One is strictly defensive and takes place above the defended territory ; it is carried out by fighting squadrons, which attack the enemy's bombing airplanes and are supported, over defended areas, by anti-aircraft batteries firing from the ground. These measures may inflict more or less serious loss on the invaders, and impair the

accuracy of their bombing by compelling the attacking airplanes to fly at a great height; but to have their full effect, due warning must be given to the defence organization, feints must be disregarded and the bombing squadrons promptly identified. For the reasons already indicated, it would be unsafe to rely solely on these uncertain factors in a scheme of defence.

The most effective form of defence against air attack is confided to bombing squadrons, some of which are specially equipped for night work. Admittedly, it is a misuse of words to speak of a bombing airplane as a defensive weapon, because it is essentially offensive, perhaps the most offensive weapon that has yet been devised. It may be argued, that since the best form of the defensive is the offensive, the bombing airplane is a shield as well as a sword. But candour in a case like this is preferable to sophistry, and the fact is that, for the present anyhow, the use of this weapon is chiefly for reprisals, and is imposed because neither the fighting airplane, nor any system of ground defence so far devised, is a sufficient deterrent to a determined enemy.

Until some device has been produced by means of which the enemy's bombing machines can be brought down, or driven off, or dealt with effectively in any other way—and so far, in spite of careful and continuous investigation, no such device is yet in sight—the only really

effective way of checking the invader is to carry the war into his country, smash up his airplane factories, and tie his machines to Home Defence.

Since both belligerents will pursue these tactics, aerial encounters may begin immediately after, if not before, the formal declaration of war. But neither belligerent will seek a general engagement between air forces; each will be aiming at vital points in the territory of the other, not only as the best means of defence, but also as the quickest way of achieving the sole object of any war, once it has started—victory at the earliest possible moment.

Sufficient has been said to give a general idea of the first phase of a war between States possessed of Air Forces. That phase may well prove to be decisive. If, after a series of aerial encounters, one belligerent were left with marked supremacy in the air, the other, for a time at least, would, in the language of Field-Marshal Foch, be "disarmed," with its fleet and army paralysed, its towns and dockyards at the mercy of the enemy's bombing airplanes, large sections of its population in a state of panic, its naval and military authorities confused, its Government faced with perturbing internal problems whose easiest solution would be found in suing for terms of peace. In the case of a continental State whose air forces had been crippled, land operations might be carried out with specially

equipped formations possessing great mobility ; but in the absence of naval bases out of range of air attack, the position of its fleet would be precarious. If properly employed, the superior air force would not be frittered away in small actions. Mass attacks would be made against any concentration of troops or warships, blow after blow would be delivered against important business and industrial centres. This dreadful procedure may be prohibited, in the abstract, by international law, but it will never be prevented once war has broken out. Justification will invariably be found, and in most cases will be irrefutable. There are few large towns which do not contain either a dockyard or an arsenal, many bridges and a railway junction. It is impossible to bomb these objectives, which are legitimate targets, since they assist the enemy to carry on the war, without slaughtering civilians and causing widespread destruction in their homes.

Once command, or even approximate equality, in the air had been lost, it would be difficult to retrieve the situation or to prevent it getting worse. During aerial encounters, the casualties in air forces will be appalling. It is estimated that they will be as high as 80 per cent. per month in pilots and machines, and in the case of the defeated air force may be even higher, since initial inferiority would increase the rate of loss. And the victims will be no

ordinary men who can be easily replaced. An air force pilot is born as well as made; he is selected for his special aptitude and then goes through a long and careful training, during the course of which the inefficient are eliminated. Many are called but comparatively few are chosen. Replacement of air personnel and machines is one of the most difficult problems of air warfare; it can only be solved by national organization and close co-operation between the Government and the aircraft industry.

If war between States with highly developed aircraft industries should occur, it will be fought mainly in the air, for these are the only States which can possess efficient air forces. It will be a life-and-death struggle, directed on both sides by men who, however humane they may be personally, will be out to win. And the way to win will be by the ruthless bombing of localities, which in many cases will be densely populated. For every combatant killed in action, ten civilians will quite probably be slaughtered in their workshops or their homes.

A horrible prospect is thus opened up, which should make the most callous shrink. To appeal to no higher feelings, the futility of such methods, as a means of settling international disputes, should be apparent. Both victors and vanquished would be left with ruined cities, widespread distress among the masses of the people, hospitals filled with the maimed and mutilated

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of all ages and both sexes, asylums crowded with unfortunate human beings whom terror had made insane. Neither indemnities nor conquest could compensate a victorious nation for such evils ; no peace terms, however stringent or vindictive, can subdue a conquered people permanently ; nor can defeat, however costly and humiliating, kill in the vanquished the spirit of revenge. So nothing would be settled, and after a few years of peace and preparation, the suicidal conflict would be renewed.

The statements in this chapter have been made without conscious exaggeration. They present, as the writer sees them, the facts in regard to future war. If it is true that civilized men and women are still so combative in their instincts that they will always want to fight, this outline may give them some conception of the prospect which lies ahead.

CHAPTER III

THE PROPOSED RULES OF AERIAL WARFARE. THE HAGUE, 1923

IN an interesting and instructive book entitled *Air Power and War Rights*,¹ the author, J. M. Spaight, dwells at length on the laws of air warfare. He emphasizes the need for detailed definition and regulation of air action in a special code, and mentions several practical objections, from an international jurist's point of view, to treating air warfare as an accessory either to land or sea warfare, or to both. On this second point his arguments seem unanswerable. Moreover, if the need for special rules was felt in 1914, when air power was almost non-existent, how much greater must it become with the development of Aviation, and when air forces replace land and sea forces to a much greater extent.

Two codes of air laws have been drawn up already. The first of these, the Air Navigation Convention of 1919, deals exclusively with peace conditions and provides expressly, in Article 38, that "in case of war, the provisions of the

¹ Longmans, Green & Co., 39 Paternoster Row.

present Convention shall not affect the freedom of action of the Contracting States either as belligerents or neutrals." Nevertheless, as Mr. Spaight points out, this Convention contains rules relating to classification, nationality, registration and marking of aircraft which, unless another conflict is precipitated, will become sanctified by custom and should be embodied in a war code.

The second code, the "Proposed Rules for Regulating Air Warfare," was drafted at The Hague in 1923. It incorporates many principles of international law and in one or more cases reproduces exactly, for special reasons, the appropriate article in naval law. But unnecessary repetition is avoided, wherever possible, by reference to pre-existing codes. The Land Warfare Regulations drawn up at The Hague, in 1899 and 1907, are the principal source from which the gaps in the proposed air warfare rules are filled by reference, as they alone are fully codified. They are, in fact, the background for all recent attempts to regulate the conduct of war on land and sea and in the air.

In the Appendix, the Proposed Rules of Aerial Warfare are reproduced, together with certain selected explanatory comments by the international jurists who prepared them.

Unfortunately, experience shows that "military necessity" tends increasingly to override

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all laws. This is especially the case in air warfare, and it is foreseeable that, in practice, many articles of the new code, if and when it becomes international law, will be more honoured in their breach than in their observance. The exception may become the rule. There are, and always have been, circumstances in which departure from the rules of war is legitimate. For example, reprisals involving the violation of positive prohibitions may be carried out if the enemy has sinned first. The classical instance of this practice is the use by the Allies of poison gas after the Germans had employed it. But once it is admitted that illegitimate acts become legitimate when they are reprisals, a vicious circle starts; and this circle will widen, inevitably and automatically, until it includes all activities and makes a large part of the code a dead letter.

Mr. Spaight states that the first and sole justification of reprisals is that they are deterrents. The word "deterrent" covers a wide field; the chief object of both belligerents is, in its broadest sense, to deter the other from taking a course of action which would win the war. Air defence is almost entirely deterrent; its very limitations make it so. Absolute protection against air attack cannot be provided. To quote M. Laurent Eynac, who has directed French Aviation for many years: "The best defence remains the attack, and there is no

surer protection than to have at your call, to reply to the enemy's blows, a solidly organized air force for fighting and *bombing* work by day and by *night*. . . ." The italics have been inserted by the present writer.

But the bombing airplane is only less indiscriminating in its action than a long-range gun, especially at night. Its legitimate targets are laid down as objects "of which the destruction or injury would constitute a distinct military advantage to the belligerent."¹ They include "military establishments or depots; factories constituting important and well-known centres engaged in the manufacture of arms, ammunition, or distinctively military supplies; lines of communication or transportation used for military purposes."² There is hardly a city in the world where one or more of these targets are not to be found.

Again, while the bombardment of cities in the immediate neighbourhood of the operations of land forces is legitimate, it is prohibited in the case of cities not so situated. The distinction is difficult to make at night and from the air; a modern army may hold a front of several hundred miles, and its *immediate* neighbourhood is difficult to define. A further complication is introduced by the rule that "in cases where the objectives specified in Para. 2—i.e. factories, etc.—are so situated that they cannot be bom-

¹ Article 24 (i).

² Article 24 (ii).

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barded without the indiscriminate bombardment of the civilian population, the aircraft must abstain from bombardment.”¹

These rules put the pilot of a bombing airplane in a dilemma. He does not drop his bombs in a serene calm atmosphere, but is often fighting for his life and is exposed to appalling risks and innumerable technical difficulties in the execution of his orders. His intentions may be, and generally are, humane and honest; he does not want to waste a bomb, out of sheer vice, on a purely civilian target; but, in spite of himself, he may often unconsciously violate the rules of war.

At once the door to reprisals will be opened wide, and the weapon *par excellence* for reprisals is again the bombing airplane. It can penetrate to the heart of the enemy's territory, and wreak fearful vengeance on civilians and combatants alike. The warfare these rules endeavour to control would then become a ghastly slaughter, above the heads and behind the backs of the opposing land forces. And the first impulse to this indiscriminating massacre might have been given by a faulty, or dishonest, interpretation of an act committed innocently, and in the performance of a legitimate operation.

Mr. Spaight urges the necessity for a ban upon reprisals, whether they are acknowledged or veiled. He also recognizes that the prohibition

¹ Article 24 (iii).

of reprisals is interlocked with restrictions upon bombardment. During the World War, the distinction between air raids which were reprisals and those which were not was vague, and it will remain so while air raids of any sort or kind are permitted. But to suggest, as he does, that the only solution is "to regulate air bombardment by rules that are simple, reasonable, practical and not a standing invitation to evasion or abuse; and, secondly, to prohibit absolutely any departure from those rules on the plea of reprisals," is to ignore the passions that are and will be loosed in time of war.

Warfare does not become more civilized with the growth of science; on the contrary, it becomes more ruthless and less susceptible to rules. History shows that, during the past eight hundred years, various interested or humanitarian efforts have been made to ban some new lethal weapon as either too effective or too cruel. In 1139, the Lateran Council prohibited the crossbow, but without effect; the Chevalier Bayard and Marshal Saxe attempted to prohibit the musket, and failed; in 1868, the Prussian Government proposed that explosive and incendiary bullets should be banned, but the British Government opposed the suggestion, and the proposed Air Warfare Rules of 1923 do not prohibit these projectiles; Pope Innocent's attempt to secure the prohibi-

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tion of high-explosive shells was equally unsuccessful.

These instances are typical of the efforts made by well-intentioned people who, because they considered war inevitable, or even beneficial—such people did and do exist—tried to subordinate it to a legal system, to limit its scope, to prevent its worst atrocities, in short, to civilize it and bring it up to date. They have failed to achieve their purposes and, unconsciously, have glossed over and thereby helped to perpetuate an international crime. Homicide, arson, the destruction of property and trespass are criminal offences; and war is a combination of these illegalities. It may be inevitable, but the attempt to legalize it must involve inconsistency if not dissimulation.

In the days of chivalry, war was a grim form of sport for the male members of the upper classes, and rules were as necessary for its conduct as they now are for golf or cricket. Even then, irksome rules were disregarded, and the tendency of war to become more lawless has continued ever since. Modern war marks the climax of this process. It is not a dynastic duel or knightly contest to be entered upon lightly, but a fierce, unlimitable struggle for existence, in which laws, chivalry and even decency are sacrificed to military needs. No restriction can operate in such conditions. When the dogs of modern war are unleashed, it is too

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late to muzzle them ; if one pack starts muzzled, it will be eaten by the others.

Instead of trying to control, restrain, mitigate or civilize modern warfare, the more logical course is to outlaw war itself, and make aggression illegal. This is, admittedly, a council of perfection ; but it does not compromise with evil, and offers a real solution towards which humanity can strive.

CHAPTER IV

THE DIRECTION AND ADMINISTRATION OF AIR FORCES

IT is not twenty years since the First Lord of the British Admiralty rejected proposals made by Wilbur and Orville Wright in the following terms :

“ I have consulted my expert advisers with regard to your suggestion as to the employment of aeroplanes, and I regret to have to tell you . . . that the Admiralty . . . are of opinion that they would not be of any practical service to the Naval Service.”

This reply represented the attitude of the British Naval and, though to a less degree, the Military Authorities towards aviation seven years before the World War.

At the time in question, few realized the revolution which aviation was destined to accomplish. If there had been no war, that revolution would have been more gradual ; indeed, it is quite possible that the older Services would to-day still regard airplanes as entirely subsidiary and auxiliary weapons, whose employment could be left to the discretion of any naval or military commander. This system pre-

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vailed in Great Britain and other European States at the outbreak of the war, when the total British flying personnel numbered only 2,041 officers and men, two-thirds of whom belonged to the Royal Flying Corps and were under the War Office, while the remaining third composed the Royal Naval Air Service, which was administered by the Admiralty. The total number of machines held on charge by both Services was 272.

After a little over two years of war, British flying personnel had increased to 86,790 and the number of machines held by the Flying Corps and Naval Air Service numbered 5,496, the distribution between the two Services being approximately in the same proportions as before. Quite obviously, a force of this size, which was continually expanding, soon ceased to be described as subsidiary. Moreover, by the beginning of 1917 it became apparent that the existence of two separate Air Service organizations, developing simultaneously and along parallel lines, resulted not only in considerable unnecessary expenditure but also in loss of efficiency. Various expedients were tried with a view to overcoming these defects, but without satisfactory results. So, at the end of 1917, the decision was reached to amalgamate the naval and military air services into the Royal Air Force.

In January, 1918, an Air Ministry was estab-

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lished under a Secretary of State for Air, and was entrusted with the administration of all air services whatsoever. Under this new organization, the real development in British aviation has taken place. By the end of the war, British flying personnel numbered 291,748 of all ranks, the number of machines on charge was 22,171, and Great Britain, according to the report of a United States Aviation Mission which visited Europe after the Armistice, "was well in the lead in practically every phase of aerial development."

To generalize from the particular is easy but not convincing; nevertheless, it may be claimed by those who favour unified control of air forces, that this system as applied in Britain, although it was introduced at a crisis of the war and improvised to a very great extent, and notwithstanding the inevitable dislocation of pre-existing organizations, did achieve great results, and in fact saved the situation. On the other hand, it may be said of the dual system that it was given a fair trial, but that the constant bickering between the two older Services caused delay and confusion in obtaining supplies, involved duplication of effort and waste of energy, with the result that money was squandered and efficiency impaired. Such a state of affairs might be tolerable in the case of a small experimental establishment in time of peace, but the system which permitted it could not,

quite obviously, survive hundredfold expansion and the test of war.

Nations maintain air forces as an insurance against war, and expect from those responsible for their direction both efficiency and economy.

Efficiency requires uniformity of training; it is bound to suffer if there are two schools of thought as different as those which always have obtained, and still obtain, in any army and a navy; it also demands the development of *esprit de corps*, which cannot exist if an airman is at the same time either a soldier or a sailor. For an air force to function properly, it must be commanded by men who understand aviation thoroughly and the characteristics of the personnel; the old days when Admirals and Generals, of sufficiently good family, commanded armies and fleets alternately and indiscriminately have passed. Lastly, there must be undivided responsibility for such purposes as air defence. To divide this all important task between two Services is to court disaster.

Economy requires standardization of types and unified control in the direction of research, design, supply and contracts.

In the United States, where dual control exists, an interesting report has been issued by the "Select Committee of Inquiry into operations of the United States Air Services." On

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page 5 of this Report the following statements are made :

“ The Committee find :

- (i) That there is no uniformity of army and navy policy as to organization, equipment, control of personnel, procurement, design or use of aircraft ; that there is no continuity of policy with respect to design and purchase of aircraft and engines in either the army or the navy ; that the attempts to co-ordinate the activities of the army and navy by the use of Joint Boards, the National Advisory Committee on Aeronautics and other Agencies have been sporadic and occasional and therefore have not achieved the results desired ; . . . that there is a certain amount of duplication in the expenditure of both money and effort by the army and navy. . . .”

Experience, facts and figures are all against the dual system, and few serious people attempt to defend it. It should also be remembered that the opposition to independent Air Services and Air Ministries as State Departments is not based on any objection to the principle of unified control, it has its origin in the not unnatural jealousy of the older Service Departments. In Great Britain, for example, the opponents and critics of the Air Force are for the most part naval officers and their friends, whose object is to subordinate this new Department to the Admiralty. In France, on the other hand, the army has always been the predominant service and the French War Office has practically entire

control of military and naval aviation, much to the dissatisfaction of the navy, to judge by a recent official French report. In Italy, the British system is being followed under the personal direction of Signor Mussolini. In America alone, the dual system prevails both in theory and practice. One explanation of this may be the geographical position of the United States, which confers present immunity from air attack, and relieves the authorities concerned from the urgent need for organizing an independent air force.

A further objection to the assimilation of air forces by one or other of the older services, or worse still by both, has been put forward, on legal grounds, by Mr. J. M. Spaight in his book *Air Power and War Rights*: "Air warfare has its own features, legal as well as operational. It is, in hard fact, *sui generis*."

Another argument in favour of unified control, under an Air Ministry as a separate department, concerns civil aviation. In Great Britain, the Air Ministry is responsible for much more than the Air Force; it exercises a measure of control over aviation in all its branches; and in present circumstances this is both necessary and desirable.

Military and civil aviation are closely interdependent, and an efficient Air Ministry will reflect this condition. But if either or both of the Senior Service Departments, whose tradi-

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tions are almost exclusively combatant, took over the functions of the Air Ministry, civil aviation would be apt to fall between two stools. The aircraft industry might get more money from the taxpayers, owing to overlapping orders, but it would suffer in the end, for the development of Empire air routes would be delayed, if not frustrated, by divided counsels and interdepartmental strife.

Thus, instead of building up a composite organization with complementary parts, like the Air Ministry in Great Britain, two separate and competing services would come into existence, without organic qualities, and having no deeper roots in the nation's life than a local habitation in some naval or military centre.

In years to come, fleets will be lifted from the sea and armies will be no longer earth-bound. Then, sailors and soldiers will be airmen, and the majority of civilians will have acquired the habit of the air. When that time comes, it may be possible to amalgamate the three Service Departments under one Ministry of Defence. But it has not come yet; and when it does come, the hope is permissible that air power will be so manifest and tremendous, that civilized peoples will be able to employ it not for making but for preventing war.

CHAPTER V

CO-OPERATION BETWEEN ARMIES, NAVIES AND AIR FORCES

CO-OPERATION between the fighting services is more difficult in peace than war. It is in the nature of things that this should be so : a national emergency imposes co-ordination, which implies co-operation, of the most various functions and drives departmental jealousy underground. Moreover, economy is less regarded ; war is an orgy of extravagance, and money to the spending departments is like oil on troubled waters, under its soothing influence the most bellicose of bureaucrats become benevolent towards their opposite numbers. Peace, on the other hand, brings retrenchment and reform, the truce between the Services is broken, and warlike instincts find an outlet in interdepartmental strife.

If proof were needed of the truth of these apparently cynical observations, it will be found in the records of the controversy between the Service Departments in Great Britain, ostensibly on the subject of co-operation, but implicitly on the status and functions of the Royal

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Air Force, since that force acquired independence under a Secretary of State. There have been somewhat similar controversies in other countries, notably in the United States, where the conflict has been bitter and the cause of at least one court-martial. Consequently, although the administrative system in each country varies with its traditions and geographical situation, the problem of co-operation with the new arm would appear to be everywhere the same, and the arguments based on British experience may be of general application.

During the later stages of the World War, the British War Cabinet decided to set up a new service department—the Air Ministry, and the functions of the Royal Air Force were defined with the agreement of the War Office and Admiralty. These functions were laid down as separate and independent; they covered the whole range of aerial activity, and the arrangement worked satisfactorily until the Armistice. Since then, however, the Admiralty and War Office, and in particular the former, have suggested modifications of the agreement reached under the stress of war, which, if followed to their logical conclusion, would result in the creation of two or more Air Services, and transfer to the Navy or the Army many of the functions allotted to the Royal Air Force.

An Army Air Service has not been proposed officially by the War Office, but artillery officers

would like to have an Army Branch of the Air Force, whose personnel would consist largely of gunners, and which would become a separate service in the end. An interesting article¹ on this subject appeared some twelve months back, whose main proposal was the reorganization of the air squadrons attached for co-operation to the Army. Under the scheme outlined, three officers in each heavy battery were to be trained as pilots, and as such to go up themselves and control the fire of their batteries from the air. At the same time, a number of staff and other officers were to be trained as observers; while N.C.O. pilots were to be employed in each squadron for test flights and moves from one Headquarters to another. How far these views are shared by the General Staff of the Army is not known; but no doubt the cavalry and infantry, not to mention the Tank Corps, would like something of the same sort. If they all had their way, and if the higher commanders insisted on making personal reconnaissances with Staff Officers as pilots, the eventual condition of the co-operating air squadron would be more easily imagined than described. No difficulty need or should arise in regard to observers; it is in their bearing on pilots and machines that these suggestions call for comment.

While recognizing how natural is the desire

¹ Major Cherry, M.C., R.A. Vol. 55, *J.U.S.I.* of India, Oct., 1925, p. 32.

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of artillery officers to control the fire of their batteries from the air, and while appreciating the great value to a commander of being able to go up himself, with a staff officer as pilot, and make a personal reconnaissance, it is also necessary to remind would-be reformers of certain facts. In the first place, flying is not merely an accomplishment which can be combined with others; it is a whole-time job demanding the highest degree of efficiency. A good war pilot must know all about his engine, his airplane, the theory of flying, wireless telegraphy, and at the same time must possess a sixth sense—air sense—which only comes with constant practice and soon gets blunted. It is necessary to insist upon these points, because a bad, or indeed a second-rate, pilot is not only a danger to himself but to others. In the second place, an airplane is not like a bicycle or motor-car, or even a horse; it cannot be handled by anyone with a little knowledge of its mechanism, without such rapid deterioration that in a short space of time it becomes unreliable in the air and, eventually, useless. These complicated machines require constant inspection, care and overhauling by experts. If they were flown one day by an artillery captain, the next by a brigade major and the third by an officer of the Headquarters Staff, who had once been through a flying course among many others, the last-mentioned might land his

general in a ditch behind the enemy's lines, quite possibly through no fault of his own. He and his chief would then have time to meditate, in captivity, on the wisdom of the cobbler in sticking to his last.

There is, however, no intention on the part of the writer to deride or discourage suggestions in regard to co-operation between the Army and the Air Force. Some of Major Cherry's recommendations are well worth considering. The more the officers and men of the two services know about each other's duties, the more they will be able to help each other, always remembering that a little learning is a dangerous thing. Military opinion is often rightly critical of the Air Force, but soldiers as a whole understand some of the difficulties of air problems and perceive the immense influence aviation is bound to have on the practice and art of war. Their attitude towards the Cinderella of the Services is something like that of Congreve towards the "devout Selinda":

"Would I were free from this restraint,
Or else could hope to win her;
Would she could make of me a saint,
Or I of her a sinner!"

The military Congreve would be well advised to conduct his courtship in a tank.

Naval opinion is more overbearing; it divides aviation into two categories—flying over land and flying over sea, and claims to control the

latter. Few naval officers of the old school can rid themselves of the idea that high-water mark is continued vertically upwards, and fixes an invisible frontier between land airmen, about whom they do not bother much, and sea airmen, whose work they once regarded as a stunt, but whom they would now adopt. Once high-water mark is crossed, going seaward, Neptune's trident should reach up, they think, and hook the joy-stick. In support of this contention they invoke the need for naval discipline, the perils and the mystery of the sea, which no mere landsman can appreciate or begin to understand.

There is a great deal to be said for this point of view, and if it could be met without sacrificing the efficiency and economical administration of defence as a whole, it would find general acceptance. In actual circumstances, however, air attack is a serious menace against which fleets and armies are impotent, and to counter which an Air Force is required, organized and led by airmen, administered and directed by a separate Air Ministry. The duties and responsibilities of this new department are multifarious and indivisible; they include the training and equipment of all air units, whether operating over sea or land. Tactical co-operation with the Navy is one of its many duties, and units for that purpose are provided, also a point of contact between the two services has been fixed. After exhaustive inquiry by succes-

sive commissions, it has been decided that the deck of an aircraft carrier is the point of contact where tactical co-operation should begin and end. There, naval authority must be supreme, for obvious reasons; but any encroachment such as that implied by the naval conception of high-water mark, either aerial or on land, would not only be wasteful administratively, it would also interfere with the more important functions of an Air Force, and therefore be strategically unsound.

It may be said without undue lack of charity that Admiralties in all parts of the world have not yet got a clear conception of the functions of an Air Force. When naval critics talk of "The Limitations of Aircraft in Naval Warfare,"¹ they expound the obvious. Admittedly, aircraft cannot, like battleships, "take and hold positions," nor can they, like cruisers, "maintain all lines of communication," or "sever the enemy's line of communication by stationing a force across it." But they can carry out air raids with a swiftness that facilitates surprise; they can, if employed in large formations, strike blows so heavy as to be decisive at vital points, such as dockyards and defended harbours, which no attacking fleet can reach. "No raiding operations ever severed a line of communication," says the writer of the article quoted.

¹ Title of an article in *The Canadian Defence Quarterly*, April, xxvi, p. 344.

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This may be so, but air raids on the grand scale will not aim at communications, their objective will be a base. "Wars will be won," this writer goes on to say, "by a comparatively slow but irresistible force which is able to move from one strategic position to another, take it, consolidate it, and move on to the next. On land this force is the infantry; on sea it is the battleship. The airplane is not of this type." Most airmen will agree with the last sentence, and most students of the last war will admit that the movements from one strategic position to another, by our land and sea forces, were, inevitably, tentative and slow, and accompanied by appalling losses.

Strategical co-operation between air forces and fleets and armies should minimize delay and reduce casualties among the combatants. The opportunities for such co-operation should be numerous—few great naval battles have been fought on the high seas, the vast majority have taken place within striking distance by air or land. Modern fleets do not consist of vessels like the *Flying Dutchman*, they are tied by the necessity for refuelling, and so far as their radius of action is concerned they are less mobile than fleets of sailing ships. A fleet at anchor is most vulnerable to air attack; harbours and ports are easily located and cannot be concealed.

Similarly, in land operations, air attack

immediately preceding an assault on a fortified position would assist the infantry materially, both by its demoralizing effect upon the enemy and the material damage it would inflict. But in all such cases the attack must be made in mass, no half measures will suffice; it must be planned and conducted by air chiefs who are thoroughly conversant with every detail of this tremendous weapon, who have waited long and patiently for their moment, who have resisted the temptation and the pressure brought to bear upon them to fritter away their forces in small actions. After air attacks of this character had been delivered, the comparatively slow but irresistible force, whether on land or sea, would be able to advance less slowly and more irresistibly to take, consolidate and hold a strategic position, whose defenders had been demoralized and whose defences had been battered by airplane bombs.

This kind of co-operation does not involve encroachment by any one of the Services on the functions of the others. Many sailors, soldiers and over-eager airmen are apt to think that co-operation implies subordination, and that one arm must be supreme. Co-ordination is of course essential, but subordination is not compatible with effective strategical co-operation between naval, military and air forces. The German great General Staff, consisting exclusively of soldiers, failed to make full use of the

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German Navy through ignorance of naval strategy and tradition; even Napoleon interfered unduly with French admirals, the nature of whose task he did not comprehend.

When a combined Staff College turns out Staff Officers of wide and general education, it is neither expected nor intended, as Lord Balfour has pointed out, that they shall be "equally competent to take command of an army, of a fleet or of an air expedition, but it is all important, as the history of these matters in this country shows, that soldiers, sailors and airmen should, as a matter of course, understand something of what their colleagues in the other two Services can and cannot do." To the foregoing it is perhaps permissible to add—"and what they cannot do themselves."

There is wide scope for co-operation between the three Services on a footing of equal status and complete independence so far as the training of personnel and the manning and equipment of units are concerned. Air units attached for purposes of reconnaissance to fleets or armies pass of course under the command of the naval or military commander; but for large scale operations, neither an Admiral nor a General could be competent to exercise such control. The mobility of an air force enables it to strike swiftly and suddenly; its blows, if it is properly employed, that is to say, in mass formations, will be terrible if not decisive; on these should

follow action by sea or land forces, so timed as to ensure a minimum of casualties with the maximum effect. Here is no question of subordination, careful co-ordination is the secret of success.

CHAPTER VI

INTERDEPENDENCE OF MILITARY AND CIVIL AVIATION

REFERENCE has been made in Chapter II to the casualties likely to be incurred in air warfare, viz. 80 per cent. per month. No comparable figures are to be found in any other form of warfare, and, obviously, no ordinary system of reserves to replace losses will meet attrition on this scale. For example, supposing a Government decided to provide sufficient reserves of men and material for a campaign of six months—i.e. in units trained and equipped for active service—it would have to maintain in time of peace nearly five times the air force considered requisite for national defence at the beginning of hostilities. Quite apart from the vast initial expenditure involved, and the considerable annual outlay on the training of personnel and the upkeep of machines, another factor would have to be taken into account. This factor is the rapid development of aviation, which puts machines out of date in an even shorter space of time than has been the case with battleships and cruisers. It is esti-

mated that the rate of wastage, in time of peace from this cause, is as high as 30 per cent. per annum. At this rate, all the machines held in reserve would have to be scrapped every three or four years. No nation, not even the United States, is rich enough to finance such a policy; too high a price can be paid even for security; expenditure beyond a certain point becomes disastrous, it bleeds a people white and lowers their power of resistance.

Another solution has therefore to be sought, and one of the most promising avenues of approach to it is the encouragement of aircraft manufacture and civilian aviation. Other conditions being fairly equal, the nation which can most readily re-equip its air force with pilots, mechanics and machines, will win the next war; and it will be a nation in which there is an established and widely scattered aircraft industry, whose population has acquired the air habit.

In a matter of this kind the first impulse must be given by Governments. In a leading article on British Aviation, the London *Times* has pointed out with great force and truth, that "The real awakening of the people of the Empire to the importance of the part which air transport will play in the shaping of their future destinies must begin from the top." Moreover, it is unreasonable to compare the aircraft industry in any country with long

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established industries like shipbuilding, or commercial aviation with a mercantile marine, and leave them to work out their own salvation. Naval construction represents only a fraction of the work done in British shipyards; but the British aircraft industry is mainly the product of the Air Force, and could not exist without the orders placed by the Air Ministry. This is more or less the case in all countries, with the exception of Germany and other defeated States.

The history of the aircraft industry in Britain has been chequered and is typical. Before the war, it was kept alive by a few men of indomitable enterprise, who believed in the future of aviation and risked their fortunes and their necks to further it. During the war, it knew prosperous times, prices were high and the demand for machines was unlimited. To meet war requirements, large plants were erected and high hopes entertained for the future. At the end of the war, a small band of enthusiasts with the pioneer spirit attempted to establish airplane services in different parts of the British Empire and throughout the world. But they discovered, to their disappointment and no slight financial loss, that they were in advance of the times, that people did not want to fly and preferred more old-fashioned methods of progression. The majority of their schemes did not mature, and, finally, only a few small

nucleus services were left, which existed precariously in England, Australia and Canada.

Eventually the various Governments concerned realized that it was necessary to support civilian aviation, and undertook to subsidize, directly or indirectly, the undertakings in which they were respectively interested. In England, the four subsidized companies were amalgamated into one, known as Imperial Airways Limited. This amalgamation was granted a subsidy of one million pounds spread over a period of ten years, which is to be repaid out of profits above a certain percentage. To earn the annual instalments, certain conditions have to be fulfilled in regard to mileage, and specified routes to and from the Continent have to be kept open.

Many people object to subsidies, some on principle, others because a subsidy being public money involves Government control. Among the latter are the more independent aircraft manufacturers, who so abhor control, that if they could, they would refuse any financial assistance from the Government which involved it. They prefer the kind of loan which may, with the lapse of years, become a grant. But in a matter of such national importance, neither persons nor prejudices, however worthy, can be respected. Air defence requires an aircraft industry, and the latter has to be created by each State, in the way best suited to the char-

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acter of its people and its geographical position. The problem is the same for all governments which realize the significance of air power. To all industrial nations aviation presents at once an opportunity and a menace, and the only way to seize the one and meet the other, is by assisting in every possible way the development of this new form of locomotion on its civil and commercial sides.

There remains to be considered the not less important problem of how best to stimulate the air habit, how to create an instructed public opinion on air questions, how to extend the practice of flying beyond professional circles and to induce people generally to regard the air as they now regard the sea, which also is life-demanding while life-giving. Here again, the first impulse must come "from the top"; in other words, from the Government concerned. National organization is required as a framework, and also some financial assistance. Once these have been provided, an appeal can be made, in the first place, on the score of national defence. There are thousands of men of the right type, in all countries, who are ready to learn the work and perform the duties of air-men, if they can do so in their own localities. The recruiting for Auxiliary and Special Reserve squadrons in London, Glasgow, Edinburgh and Belfast has shown that the desire for air knowledge does exist; and it is safe to say that if

instruction were given in other places, where it might be required, for other purposes as well as home defence, an ever-increasing number of people would take advantage of it. For example, many business men would learn to fly if there were increased facilities for doing so, and if they could obtain machines at a reasonable price. In Britain, there are already one thousand members of light airplane clubs; many of these have taken to aviation as a sport, but its advantages in transacting business are too obvious to be neglected.

Perhaps the most far-reaching method of inculcating the air habit consists in enlisting the co-operation of the best brains of the country in aeronautical research. If they were certain of a career, however modest, many men of science, especially the younger ones, would devote their best efforts to the investigation of such questions as stability in flight, control, the use of metal in airplane construction and the improvement of engines. There is still room for progress on these lines, which would not only be of great benefit to both military and commercial aviation, but would also make flying safer, consequently more popular, and therefore cheaper in the end.

Money expended on research is always a good investment. "The reason why the world hath not many Aristotles, is because it hath so few Alexanders," observed Bishop Wilkins, who flourished in the seventeenth century, taught at

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Wadham, was Master of Trinity College, and wrote a treatise *Concerning the Art of Flying*.

If there were more men at all universities like this worthy prelate, who, incidentally, was one of the founders and the first secretary of the Royal Society for Aeronautical Research, youth would soon "walk or climb up into the air," and acquire the air sense and habit.

CHAPTER VII

AIR TRAINING AND EDUCATION

AIR PILOTS may be born, but they have also to be made ; many potential " Aces " must have lived, and may still be living, who, for lack of opportunity, have never held a joystick. The training of a pilot is a hazardous and costly business ; his active flying life is relatively short, and until civil and commercial aviation have been more developed, the vast majority of airmen, in countries possessing air forces, will begin their careers in Government service.

The term " airmen " includes mechanics. When national aircraft industries have been established on an adequate scale, it will be possible for air forces to draw on them for a proportion of the mechanics needed by military aviation ; meanwhile, however, Governments have to undertake the training and general education of aircraft apprentices. Moreover, whatever developments may take place, it will prove sounder in the end to train the bulk of Air Force mechanics in the service. Their work is of a special character, it requires not only

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technical qualifications, but also team spirit, *esprit de corps* and general knowledge; to acquire these, boys must be educated as well as instructed, and their education should begin at an early age.

It may be claimed, without undue patriotic bias, that the Colleges and Training Centres administered by the Air Ministry in Great Britain are as up to date and comprehensive in their courses of instruction as any in the world. A general description of the methods adopted in them may, therefore, be of general interest.

In all these institutions, the governing principle has been and is that, while service considerations must of course come first, the training given to both officers and men shall be such as will enable them, when they return to civil life, to hold their own in competition with civilians. This principle is imposed by the fact that the Air Force, like the Army and the Navy, though possibly to a less extent, does not offer a career for life to all its members. A large proportion of the officers and non-commissioned officers can count on good salaries while serving and pensions when they retire, but some officers and airmen leave the Service while comparatively youthful, and have to earn their livelihood. Provision is made for both these categories in the system now established.

There are two methods of obtaining a perman-

ent commission in the General Duties Branch¹ of the Royal Air Force :

(i) Through the Cadet College at Cranwell.

(ii) Through a recognized University.

Cranwell corresponds to Woolwich and Sandhurst in Great Britain, and to West Point and Annapolis in the United States. This College is maintained to afford a special education to candidates who desire to make service in the Royal Air Force their life profession. Cadets who pass out successfully are posted to Air Force Units as Pilot Officers, and may rise to the rank of Air Chief Marshal.

To enter the College boys must be between the ages of 17½ and 19½ years, and have passed a competitive examination conducted by the Civil Service Commission, unless they have been specially nominated as King's Cadets, or by the Air Council, or by selection from among the aircraft apprentices. The course of instruction is admirably devised to develop the moral, mental and physical qualities of a man ; any boy who takes full advantage of it gets a good start in life. During his two years at Cranwell, he is under continual and vigilant supervision, works in emulation with some of the brightest lads in the kingdom, and learns, in addition to the technical details of his profession, something of literature, general history and science. The

¹ In this Branch all officers must be qualified as pilots.

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maximum cost of his education to his parents is £155 for the first year and £95 for the second ; these sums include payments for uniform and books. The charges are lower still for King's Cadets, Prize Cadets, the sons of deceased officers who served in the Army, Navy or Air Force and those of Warrant and Non-Commissioned Officers either serving in or retired from the Royal Air Force. During their first twelve months, cadets receive pay at the rate of 5s. per diem and a daily allowance of 1s. for messing and washing ; the pay is increased to 10s. per diem during the second twelve months.

It will be seen that much is given to these young men, but much also is expected from them. A Pilot Officer has to possess skill, daring and quick judgment. There are moments when nothing can save him in the absence of these qualities. His work demands both mental and physical fitness combined with the temperament of an airman ; to discover and develop the latter is the task of his instructors. Not every boy, however alert and healthy, can make a pilot ; and the fact that the majority of those who pass out successfully each year and join the Royal Air Force do credit to their training and themselves, is a proof of wise discrimination on the part of the Staff at Cranwell and of virility in the race.

The following is the syllabus of instruction given to cadets at Cranwell :

FIRST YEAR

(i) *English language and literature.*—To be studied from the standpoint of enabling flight-cadets to express themselves clearly and concisely in speech and in writing, of creating an interest in reading, and of developing the capacity to use books intelligently for the purposes of general culture and of technical research.

(ii) *General ethnology.*—To create an interest as an incentive to voluntary study of the subject and to introduce the flight-cadet to a general knowledge of the chief races of mankind, their division into nations, their origin, and the general lines of their development.

(iii) *The British Empire.*—Its history, social and industrial development, and relations with other States.

(iv) *Applied mathematics, including mechanics and draughtsmanship.*—To be studied as a subject of practical utility in relation to an officer's professional career and as a means of developing the power of clear and accurate reasoning. A knowledge of elementary mathematics, algebra, geometry, and trigonometry will be assumed, and the work will be closely correlated with that in the technical subjects of study. Special attention will be given to applied mechanics, to graphics, and to practical work in the laboratory.

(v) *Elementary physics.*—The fundamental principles in special relation to aeronautics.

(vi) *History of the Royal Air Force.*—The part played by it in the late war and its present organization.

(vii) *Theory of flight and rigging.*

(viii) *Air pilotage. Map reading.*

(ix) *Reconnaissance reports and observer's training.*

(x) *Drill (with rifles) and physical training.*

(xi) *Air Force law and administration.*

(xii) *Hygiene and sanitation.*

(xiii) *Workshops and engines, including practical work in workshops, with instruction in metal and woodwork.*

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- (xiv) *The Morse Code, and signals.*
- (xv) *Practical flying, including instruction in the duties of an observer.*

SECOND YEAR

- (i) *Theoretical and practical instruction in internal combustion engines, including magnetos and their management.*
- (ii) *Aerodynamics.*
- (iii) *Practical instruction in rigging.*
- (iv) *More advanced work in the wood and metal workshops.*
- (v) *Outline of wireless telegraphy and telephony.*
- (vi) *Armament.*
- (vii) *Practical flying.*
- (viii) *Air Pilotage and airmanship.*
- (ix) *Meteorology.*
- (x) *Outline of the organization of the Navy and Army, with characteristics of the various arms and types of ships.*
- (xi) *War, strategy and tactics.*

Unmarried University men, under twenty-five years of age, who have taken their degrees, after three years' residence, and are recommended by the Governing Body of a recognized University, are also eligible for direct commissions in the Royal Air Force. They must first appear, however, before Selection and Medical Boards at the Air Ministry; after passing these, they are attached to a flying unit during the Long Vacation for a period of six weeks, at the end of which, if the report of the C.O. on their capacity and conduct is

favourable, they are granted commissions and continue their instruction at an Air Force training school.

There remains a third category of officers in the Royal Air Force, i.e. those enrolled for Short Service. Candidates for Short Service commissions are examined by a Board of Officers at the Air Ministry, and if accepted get their training at a flying school. The intention of this system is to catch young men who take an interest in aviation but do not wish to spend their lives in the Royal Air Force. After a few years on the active list, officers in this category join the reserve, in which, without cost to themselves and at times and seasons which do not interfere with their civil vocation, they can maintain a reasonable standard of efficiency as pilots. During their active service these officers are well paid; on leaving they receive a bonus, the amount of which varies, but is seldom less than two or three hundred pounds. While in the Reserve they are eligible for promotion and draw an annual retaining fee of £30, subject to their having complied with the regulations as to training.

While officers are given the opportunity of studying, by means of courses of instruction, some branch of engineering or science which may be useful to them in private life, the same principle is even more extensively applied to the training of the rank and file. All skilled

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Air Force tradesmen are taught a basic trade, to ensure them, as far as possible, against unemployment when their term of service has expired. Boys are accepted between the ages of fifteen and seventeen, and whenever possible, their own wishes and those of their parents in regard to choice of trade are followed.

One thousand boy apprentices are required every year by the Royal Air Force. Boys of promise, between the ages of fifteen and seventeen, are accepted; they are drawn mainly from the secondary schools, technical schools, continuation—day or night—schools. Entry is by competitive examination for the majority of candidates, except in the case of a limited number of boys whose fathers' services entitle them to exemption.

Boys who enter the Royal Air Force as aircraft apprentices are given a three years' training in a skilled trade at one of two establishments—Halton, in Buckinghamshire, and Flowerdown, in Hampshire. At the first-mentioned, instruction is given in carpentering, rigging and metal working; at Flowerdown electrical and wireless trades are taught. From the date of their admission apprentices become self-supporting, they are well fed and clothed, paid at the rate of 1s. a day for their first two years and of 1s. 6d. during the third year.

As soon as possible after joining, each apprentice is allocated to the trade of his choice if

a vacancy exists. The trades in which the majority of apprentices are trained are as follows :

(i) Carpenter (rigger). A high degree of skill is required in this trade, together with both theoretical and practical knowledge of the construction of airplanes. The first part of the course is devoted mainly to gaining skill of hand and the second to practical aircraft construction.

(ii) Fitter (aero-engine). This is one of the most important Air Force trades. The first part of the course is devoted to the basic trade of fitting, the second to the upkeep and repair of aero-engines. A small number of apprentices specialize in mechanical transport engines, armament, torpedoes, etc.

(iii) Electrical Trades. In these trades, boy apprentices are trained either as electricians or wireless operators ; the course includes instruction in the practical work of an electrical fitter, and in the fitting and turning needed to make the small parts for a wireless apparatus.

(iv) In addition to the foregoing, training is given in a number of other no less important trades, such as pattern-making, coppersmith's work, instrument making and turning.

After their three years' training, a certain number of apprentices, who have displayed special ability and ambition, may be recommended for cadetships at Cranwell ; if they emerge successfully from the first six months'

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probation at that college, they follow the normal course of training for pilot officers, but are dispensed from paying both the educational fees and the deposit for books and uniform. Thus it is possible for a boy to receive a good technical training and general education, at practically no cost to his parents; then, to enter a cadet college, where the normal charges are almost entirely remitted; and, eventually, to get his feet on the bottom rung of a ladder by which he can climb to the highest rank.¹

Less brilliant lads can qualify as airmen pilots, and after passing the flying tests obtain promotion to the rank of Sergeant before they reach the age of twenty. A limited number of these airman pilots can obtain permanent commissions.

Lastly, apprentices of ordinary ability, who have qualified in their passing-out examination as aircraftsmen, are advanced to that rank on reaching the age of eighteen. They can then count on twelve years' service in the Royal Air Force, and promotion, on their merits, up to the rank of 1st Class Sergeant-Major. They should then, if discharged from the Air Force, be expert craftsmen in a skilled trade and possess a good general education.

Special reference has been made to three training institutions which attend to the early

¹ The Cadet who passed out first from Cranwell in 1926 was a Halton boy.

stages of an airman's career. But in point of fact, the training of an airman never ends. After their *ab initio* training, pilots get further training in their units, and the syllabus of the annual training of these latter includes such various activities as day and night bombing practice, co-operation with the fleet and army, and coast reconnaissance flights. There are, in addition, short courses, long courses and special courses, and so multitudinous are the functions of the Air Force that the most capable officers have to specialize as they do in the Army and the Navy.

While the general principles governing the training of officers and airmen are laid down by the Air Council, whose members indicate the lines on which it should proceed and the standard of efficiency which all ranks are required to attain, the training of the Fleet air arm is the joint responsibility of the Admiralty and Air Ministry.

This training includes "taking off" and "landing on" the deck of an aircraft carrier, naval organization, naval discipline, naval customs and etiquette, fleet formations and ship recognition. Similarly, the personnel of Army Co-operation Squadrons are instructed in the organization and tactics of all arms of the Army, in ground and aerial gunnery, and in tactical schemes in the air, with or without troops.

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Such, in broad outline, are the different forms of training through which airmen have to pass. When it is remembered that hundreds of young men are trained as pilots annually, that sometimes at the flying schools more than fifty beginners are simultaneously in the air, and that most of them are high-strung lads with the vices of their virtues, or, in other words, inclined to be a little reckless, it will be admitted that the small number of accidents that occur is a signal proof of the care exercised by their instructors and the excellence of the system.

In the preparation of a fighting pilot some risks are inevitable; they can be and are reduced to a minimum by constant attention, not only to his physical well-being, but also to his nerves. In work like flying, overstrain, worry, a too vivid imagination, some slight mishap affect the powers of the most brilliant pilots. It is one of the chief duties of responsible air commanders to develop their powers of observation and to be always on the look-out for symptoms, which to an inexperienced eye are imperceptible, but which may presage a breakdown. Pride often prevents a pilot from asking for a rest; he is apt to live upon his nerves and go on working till "the breaking point" is reached. Many a fatal accident has been due to this cause.

The personnel of an air force is very different

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to that of the other fighting services. This sensitive human mechanism requires careful handling by men who know from personal experience what the work of a fighting pilot is, in all its details, technical and human, with all its risks and compensating thrills.

CHAPTER VIII

AIR POLICE

THERE are certain regions, known as backward, which have a special interest for Great Powers. This interest, as a rule, is due less to their backwardness than to their geographical position and their natural resources. In some cases, other motives operate: there may be a Christian element in the population which needs protection; pledges may have been given to a section of the inhabitants or a dynasty whose violation would be injurious to the prestige of the Great Power concerned; the status and subsistence of masses of refugees, ex-prisoners of war and others who, during and since the war, have followed and settled under the protection of armies of occupation, may have to be considered.

The World War brought into prominence several of these regions, which had to be taken care of for one or more of the reasons given above. At first they were placed under the wing of the League of Nations; later, that body entrusted the development of the more important of them—Mesopotamia, Palestine

and Syria—to Great Britain and France respectively. These became Class A Mandated Territories, and as such differed from ordinary territorial acquisitions, in that their occupation was intended to be of a temporary character ; it was to cease when they became sufficiently developed for full self-government and had qualified for admission to the League of Nations as sovereign independent States.

Great Britain's mandate in Mesopotamia, or that part of it called Iraq, is typical. The geographical position of this region makes it an indispensable link in the air route to India and Australia ; during the war, the British Government gave pledges to a section of the population—the Assyrian Christians, the members of the present reigning family and their adherents—in return for their support, that, after the war, they would be protected from Turkish aggression and hostile Arab tribes ; during and since the war, Iraq has been occupied by British forces, under whose protection large numbers of the present inhabitants have lived, and the existence of these latter would be, to say the least, precarious, if that protection, in some form or another, were withdrawn. In these circumstances, the way in which law and order are maintained in an almost roadless country, many of whose inhabitants are nomadic, supplies a noteworthy illustration of one of the many applications of air power.

When it first assumed the Mandate for Iraq, the British Government installed a garrison on the old pre-war lines. In July, 1920, the strength of the British garrison was over 120,000 men, of whom some 60,000 were combatants. The additional annual cost to British taxpayers on this account exceeded £20,000,000. The duties of the garrison were:

(i) To prevent disturbances among the population, which was very mixed and included fanatical elements in addition to some extremely truculent tribes;

(ii) To protect the mandated territory from invasion by the Turks, its former owners;

(iii) To enforce the terms of peace.

Neither (ii) nor (iii) called for special efforts, but the magnitude of the task imposed by (i) may be gathered from the scope and character of the insurrection which occurred in 1920.

As in most insurrections, the causes were due to faults on both sides. The nomad tribesmen resented methods of administration brought from India, and complained that they were over-taxed in comparison with the wealthy Arabs living in Baghdad and other towns. On the other hand, Turkish propaganda was rife among these uneducated people, and aimed at the restoration of Turkish rule, which would have postponed indefinitely the creation of an independent Arab State.

Hostilities commenced on the Lower

Euphrates and lasted from the end of June to October, 1920. Four towns were invested by the rebels, the Mosul Vilayet was cut off from Baghdad, and more than 130,000 armed tribesmen took the field. In the course of the fighting the British casualties exceeded 2,200, killed, wounded and missing; the Arab losses probably exceeded 8,000.

These figures have been given to illustrate the difficulties which confront a Mandatory Power. To cope with them, two courses of action may be taken—either a strong military force has to occupy the territory, with scattered detachments and long lines of communication, or else the new weapon, the airplane, can be employed as a substitute for land forces. In point of fact, the cost of the first of these alternatives was, under post-war conditions, prohibitive, and the adoption of the latter was a case of Hobson's choice.

Events have justified what was considered at the time a bold and hazardous experiment. To-day, law and order are maintained throughout Iraq almost entirely by a detachment of the Royal Air Force, which performs the functions of Air Police. Eight squadrons of airplanes, supported by a few battalions, some armoured cars and tanks, and a few brigades of local troops, have replaced a British garrison of close on 50,000 fighting men. The expenditure involved is less than one-fifth, and the number

of Europeans exposed to a trying if not unhealthy climate has been considerably reduced.

To understand how this state of affairs has been rendered possible, the requirements of the situation must be considered. They are—a ubiquitous show of force in support of the civil administration, and prompt action against disturbers of the peace. Where military forces are the sole backing of the civil authorities, ubiquity involves numerous scattered detachments, and this dispersion is both risky, from a tactical point of view, and a source of irritation to the inhabitants. Prompt action is possible only when the local detachment is strong enough to suppress disorder; if the disturbance assumes a serious character, and reinforcements have to be sent to relieve the beleaguered garrison, their advance is inevitably slow and they may arrive too late.

When this cumbrous method is compared with that rendered possible by the use of airplanes, the advantages of the latter become obvious. Modern airplanes can cover all the ground within a radius of at least 250 miles around their base. When a political officer asks for a show of force, by wireless, within a few hours the airplanes arrive. If need be they can bring up troops; a hundred men arriving in this sudden fashion are worth a thousand later on. If air action is found necessary, it is not only swift but terrible.

Two lines of argument have been taken against these methods. The first is that the effect of airplanes soon wears off ; that the respect due to wonder disappears with familiarity, and that fear ceases when those liable to attack have learned how to camouflage themselves and their flocks and herds. The second has for its premise that bombing is barbarous and unsporting against an enemy not similarly equipped. Those who take this line conceive the Arab as a peaceful, picturesque and pastoral person, whose one desire is to live in peace under a palm tree. Unfortunately, this is not so ; the problem in Iraq would be simple if it were. The fact is that many of these Arabs, in their treatment of each other and even in their sports, display appalling cruelty and savagery ; that as a race they are averse to any settled form of government, and despise attempts to rule them that are not based on force.

Nevertheless, both points of view contain an element of truth, and in the administration of a country like Iraq should never be overlooked. To bomb a village or a flock of sheep is a horrible proceeding, from which all decent airmen shrink. Under no circumstances should such bombing be permitted for the purpose of enforcing the collection of taxes ; or indeed for any purpose until it is inevitable ; the rarer it is the greater its effect. The sole uses of this terrible and, in spite of all precautions, indiscriminat-

ing weapon, are to nip disturbance in the bud, to punish notorious offenders, to resist attack and to follow up a victory over the forces of disorder.

Before bombing is resorted to, demonstration flights should be made over the point selected for attack, usually the most inaccessible stronghold of the rebellious tribe. These demonstration flights should be in sufficient force to distinguish them from routine flights, and on each occasion an ultimatum should be issued explaining the true facts of the situation and the penalty for recalcitrance. Although the element of surprise is thereby sacrificed, no efforts should be spared to give full warning of attack to non-combatants. In many cases, such demonstrations have sufficed; the chiefs concerned have submitted to the civil power, and bloodshed has been avoided.

But when air attack becomes inevitable, it must be thorough. Partial, spasmodic bombing causes widespread irritation, and in the end breeds contempt. The attack with machine-guns and bombs must be relentless and unremitting; half-measures, so far from being humane, are a useless infliction of suffering and loss, and only postpone the evil day.

To many, these methods will appear so brutal as to be in no circumstances excusable. But would these objectors prefer to let Iraq relapse into chaos, as in the absence of a controlling

power, for the present anyhow, it undoubtedly would; to abandon the Assyrian Christians to their certain fate—extermination; to hand over the Arabs who have accepted our pledges and the new *régime* to slavery and spoliation? A sense of proportion is required in these matters. This much can be said with certainty—law, order and prosperity prevail now in Iraq and the people are slowly but surely developing their powers of self-government; there is no doubt discontent in certain quarters, but the vast majority of the population live better and in greater safety than they did before the War.

For these conditions, the judicious and restrained use of air power is to a very great extent responsible.

The following tables give details of the situation in Iraq at the commencement of and during the 1920 insurrection:

STRENGTH OF MILITARY FORCES IN IRAQ AT OUTBREAK OF INSURRECTION, JULY, 1920.

Combatant troops (British)	. . .	7,200
Combatant troops (Indian)	. . .	53,000
Regimental establishments (Indian)	. . .	5,500
Labour Corps	} 55,000
Inland water transport		
Water supply stations		
Electric lighting station		
		<u>120,700</u>

Above numbers exclude troops in hospital and in transit, also Persian force consisting of:

4,800 British and 8,000 Indian troops.

*Reinforcements from India, period August 6 to
September 29, 1920.*

Combatant troops (British and Indian) . 15,414.

Regimental establishments reinforcements not included.

SUMMARY OF OPERATIONS CARRIED OUT BY THE
R.A.F. IN IRAQ DURING THE INSURRECTION, JULY
TO DECEMBER, 1920.

(i) *Operations :*

Total number of hours flown	4,008 hours.
Total weight of bombs dropped	97½ tons.
Total number of S.A.A. fired	183,861 rounds.

(ii) *Casualties :*

Officers killed in action	6
Other ranks killed in action	3
Officers wounded in action	5
Other ranks wounded in action	2
Airplanes lost in hostile country	11
Airplanes temporarily placed out of action by hostile rifle fire	57

(iii) *Airplanes Erected :*

R.E.8	5
D.H.9	1
D.H.9. A	63
D.F.	23
	—
Total	92

(iv) *Aero Engine (Complete Overhaul) :*

140 h.p. R.A.F.	9
240 h.p. Puma	1
400 h.p. Liberty	61
270 h.p. Rolls	27
	—
Total	98

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(v) *Mechanical Transport Overhauled :*

Leyland	15
Crossley	44
P. & M.	10
Miscellaneous	18
	—
Total	87

Units Employed :

- ¹ No. 6 Squadron Bristol Fighter.
- ¹ No. 30 Squadron D.H.9 A.
- No. 55 Squadron D.H.9 A. From Constantinople,
commenced operations October
20.
- No. 84 Squadron D.H.9 A. Formed in Baghdad,
commenced operations Sept. 20.

**BRITISH AND INDIAN CASUALTIES DURING INSURRECTION
FROM JULY 2 TO OCTOBER 17, 1920.**

	Killed.	Wounded.	Died of Wounds.	Miss- ing.	Prison- ers.	Died while Prison- ers.
British Officers	19	43	2	5	—	—
British Other Ranks . .	38	57	5	136	79	1
Indian Officers	7	39	4	4	—	—
Indian Other Ranks . .	243	1,040	100	278	74	—
Followers .	15	49	2	28	11	—
	312	1,228	113	451	164	1

Total: 2,269. Most of the missing were killed, a few only rejoining. Arab casualties probably numbered 8,450 killed and wounded.

¹ Re-equipping, and below establishment when operations commenced.

CHRONOLOGICAL TABLE SHOWING TOTAL STRENGTH,
BY AREAS, OF TRIBES WHICH PARTICIPATED IN 1920
INSURRECTION.

	Date.	Number of Armed Men.	Rifles.	
			Modern.	Old but Service- able.
Lower Euphrates . .	30.6.20	2,500	500	1,000
Lower Euphrates . .	2.7.20	16,300	2,500	6,200
Middle Euphrates . .	20.7.20	16,500	2,200	6,000
Middle Euphrates . .	24.7.20	48,100	4,630	19,795
Middle Euphrates . .	30.7.20	16,270	800	3,000
Lower Euphrates . .	30.7.20	4,350	680	1,600
Diyalah Division . .	9.8.20	1,600	200	100
Baghdad-Falliyah Muf- raz Area	12.8.20	7,500	900	2,050
Diyalah Division and Kirkuk-Kifri Area . .	12.8.20	14,300	2,800	2,990
Sammawah Division . .	24.8.20	3,000	1,245	365
Grand Totals		131,020	16,630	43,175

SUPPLIES DELIVERED BY AIRPLANE TO KOICOL
DURING OPERATIONS MARCH 18, 1923, TO MAY 15, 1923.

<i>Article.</i>	<i>Quantity.</i>
Accumulators, W/T	1 set
Boots	840 pairs
Boot-repairing material	100 lb.
Buckles and straps	550
Canteen supplies	2,000 lb.
Chargals	150
Dubbin	270 tins
Helmets, sun	24

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<i>Article.</i>	<i>Quantity.</i>
Horseshoes	1,000
Horseshoe nails	7,000
Headropes	500
¹ Mail sacks	99
Medical stores	7 packages
Nose-bags	1,200
Oil	8 drums
Pull-throughs	500
Pugarees	50
Puttees	500 pairs
Rope, 1 in. (to expedite crossing of river)	500 fathoms
Rations and barley	5,440 lb.
Socks	3,000 pairs
Shirts	4,000
Shorts	500
Sheets	40
Saddlers' equipment (complete).	
Soap	1,400 bars

¹ Some sacks probably contained equipment or supplies.

CHAPTER IX

AIRSHIPS

IN the year 1823, the Rev. R. S. Medley remarked sententiously, and poetically :

“ I think an air balloon quite fairly can,
Be made the emblem of a wicked man ! ”

These were the early days of gas-bags. No doubt, the reverend gentleman expressed a widely held opinion ; from the earliest experiments up to the present time, airships have aroused misgivings in the minds of scientific as well as pious people. For example, Dr. Joseph Black, who first suggested the use of hydrogen, wrote a letter, in 1784, on the subject of balloons, in which the following passage occurs :

“ The only circumstance which enables them (balloons) to subsist in the air, however brisk the wind may be, is that, as soon as they rise, they are in effect perfectly becalmed . . . this tranquillity of the air with respect to them is one circumstance which contributes to that composure of mind which many of those feel who mount with balloons. I can imagine, however, that in a hot climate, when the weather is perfectly calm and the sun shining bright, a large balloon ascending with considerable velocity may occasion a whirlwind and be involved in it. . . .

And this among other things shows the folly of attempting to give it motion at pleasure or to command its motion and direction when it is up in the air. . . .”

The Doctor goes on to explain that, even if the power were found to give motion and direction to a balloon, and this he seems to doubt, any attempt to make use of it would destroy the balloon. Although whimsical and pessimistic, this letter, written nearly one hundred and fifty years ago, does give a fairly accurate indication of the difficulties to be overcome in the construction of airships. And even to-day, when confronted with a long series of disasters to lighter than air vessels, the ordinary member of the public is inclined to be discouraged and to doubt their practical utility.

As usual, both the pessimism of critics and the enthusiasm of partisans in regard to airships have been exaggerated. The critics forget that more than a million miles were flown during the war by the smaller types of airship, which protected our commerce from the attacks of submarines; that from the year 1910 up to the outbreak of the war, the Germans operated regular airship services with considerable success—during this period over 800 flights were made, 17,000 passengers were carried, and about 100,000 miles were covered without one fatal accident. Indeed, past experience shows that small airships are fairly reliable. Most of the serious mishaps have occurred to large, rigid

vessels which, it should be remembered, were designed originally for war purposes, and for that reason risks were run in order to obtain the maximum possible performance.

On the other hand, over-eager enthusiasts would like to rush an airship programme through without due regard to "Safety First." Between these extremes there is a middle path, and those responsible for the development of airships should possess an all too rare combination of patience and constructive imagination. Their task is as difficult as it often is ungrateful—to regulate enthusiasm and yet not discourage it, to ensure safety and yet not stifle enterprise.

The cold facts of the airship situation are, in the first place, that much has yet to be learned in regard to strains caused by eddies or gusts when an airship is being driven at high speed; also, further investigation is required into the forces and moments produced by the partial or complete deflation of one or more of the gas-bags inside the outer envelope. The disaster to the "Shenandoah" was undoubtedly caused by these strains and stresses. To guard against a similar tragedy recurring in the future, a cautious policy involving intensive research is essential. Such research must be patiently conducted by disinterested persons. Some private firms may have the personnel required, but few are rich enough; and the only alter-

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native is to entrust this work to a Government Department.

There are two risks in airship construction : a commercial risk and a technical risk. Until airships have been thoroughly tried out and their safety and convenience proved, they are not likely to be of much commercial value. Trying out involves a costly and unremunerative period, and the construction of at least one experimental ship. In addition to the cost of the ship itself, there are many other expenses ; sheds, machinery and gas plants have to be provided and maintained. No private firms, at any rate in Great Britain, are willing to face this expenditure, and at the same time run the risk of failure, without some form of Government assistance. They ask either for a subsidy or an order for a ship, which, in the case of a first ship, implies a price far in excess of the vessel's actual value.

Another fact in connection with airships is, that an elaborate ground organization is required before any regular service can be started. Terminal stations, with one or more sheds, intermediate stations, with mooring-masts, emergency landing-grounds, all equipped with repair shops and manned by skilled mechanics, are as indispensable to airships as dockyards and harbours are to ocean-going steamers. This analogy is almost exact, and just as the large modern ocean liner requires special dock

accommodation, so will the giant air liners of the future be tied to certain air ports. They cannot be launched into the blue, and the absence of ground arrangements will almost surely cause disaster. The loss of the "Dixmude"¹ was attributed to this cause. Although these facts should be apparent to any business man, the outlay they involve is frequently overlooked by optimistic and enterprising persons, whose ideas may be sound enough, but who, especially when they are getting financial assistance from their Government, are apt not to look before they leap.

Since the chief purpose of the airship is long-distance flight, the rigid type only is worth considering, and the tendency is towards gas-bags of much larger capacity than have been employed heretofore. In spite of their excellent war record, small airships have a "useful" load so limited as to rule them out of consideration for most military or commercial purposes.

Bearing all these facts in mind, two years ago the British Government embarked on an airship programme, whose principal features were—the construction of two 5,000,000 c.f.²

¹ An airship taken over by the French from the Germans, which was lost over the Mediterranean.

² This is the capacity of the gas-bags; it represents a buoyancy about twice as great as that of any airship yet constructed.

airships, one by the Air Ministry and the other by a private company, the general design of both being laid down by the same body of experts. As a preliminary to and concomitant with the construction of these ships, exhaustive research and experiment, including flying trials under various climatic conditions with an old ship reconditioned for that purpose, form part of the programme, which includes also the provision of an air highway between England and India, equipped with terminal stations in both countries and an intermediate mooring-mast in the neighbourhood of Egypt. This programme is tentative and experimental. During the construction period, no preconceived ideas will be allowed to interfere with the fullest use being made of new discoveries and new lessons, wherever they may come from, or however radical the changes they may make in the original design. In these conditions, if there is competition between the two sets of constructors, it should be healthy emulation and lead to mutual picking of brains. Both have a great responsibility to the public and every inducement to do their best; neither is starved for funds, nor is there any question yet of profits. The sole immediate objective is a certificate of air-worthiness from the Air Ministry.

When complete these ships will provide first-class cabin accommodation for 100 passengers, with the usual accessories, restaurants, smoking-

rooms, and promenade decks. They will have an average speed, under standard conditions, of 63 miles an hour. At this rate, London and Bombay will be brought nearer together, in point of time, than London and Edinburgh were a century ago.

During the last two years, airship research in Great Britain has been fruitful of results. One of these has been that the air staff has become convinced of the potentialities of airships for Home and Empire Defence. The utility of these vessels as troop transporters has long been recognized, though fighting airmen were inclined to doubt their value for other purposes, one reason being their vulnerability to air attack. It is now realized that, as listening stations only, their usefulness will be considerable, since the radius over which sounds can be detected increases with the height of the apparatus, and longer warning would be given of the approach of hostile aircraft by an instrument in an airship than is now possible from stations on the ground. But if, in addition, they can be designed to serve as airplane carriers, they will add enormously to the defensive strength of air forces. Defending airplanes could then be launched at a height of several thousand feet, thus saving the time required for climbing, and giving them an initial advantage over the invaders.

Airships will no doubt attain great power of

manœuvre, both horizontally and vertically; although so vulnerable, they will when armed be able to hit back; when they are able to receive as well as launch fighting and bombing airplanes, their offensive strength, combined with their mobility and range, should make them effective substitutes for cruisers, and at a much lower cost.

This use of airships will bring the continent of America within striking distance by air of Europe and, eventually, of Asia. It will thus transform the Air Defence Problem of the United States from a hypothetical and largely academic question into one not dissimilar, though still less immediate, to that which has to be faced by the States of Europe.

It is perhaps too soon to speculate on the uses, or abuses, of the airship. To do so gives ample scope to the imagination. In fancy, one can see them floating like monstrous insects over a hostile land, while from their flanks winged offspring would emerge like angry wasps, to fighting defending airplanes in their native air, or to rain death and destruction from the skies. Air encounter between two fleets of these aerial mammoths can more easily be imagined than described. No conflict on land or sea could approach it in terror and sublimity.

The following list gives the names and nationalities of airships lost since the war, and the causes of their loss :

Date.	Nationality.	Type.	Circumstances of Loss.
July 1 .	U.S.A.	1919 Non-rigid C 8	Exploded after landing.
July 14 .	British	Non-rigid NS 11	Believed struck by lightning, as there was a thunderstorm in the vicinity at the time, although there was no direct evidence owing to the whole crew being killed. An examination of other airships of this class showed that the system of blowers for balloonettes might have permitted red-hot carbon from the engine silencer to be drawn up in the envelope, which might have ignited the hydrogen. Nine killed.
July 21 .	U.S.A.	Non-rigid NR	An advertising airship fitted with a rotary engine, Gnome type; the valves blew out into the envelope and ignited the gas, the airship falling on a building at Chicago. A rotary engine of this type has never been considered a suitable power unit for airships. Eleven killed and twenty-five injured.
January 28	British	1921 Rigid R 34	Wrecked handling into the shed.

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Date.	Nationality.	Type.	Circumstances of Loss.
July	U.S.A.	C 3	Destroyed by fire. Cause unknown. Crew escaped.
August 24 .	British	Rigid R 38	Structural failure followed by fire. It is probable that the breaking of an electric wire ignited petrol fumes in the keel, the petrol pipes having been broken. The aft portion of the ship free-ballooned down without catching fire, owing to the electric leads being dead and therefore no source of ignition available. Forty-four killed.
October 14	U.S.A.	Non-rigid	Wrecked at sea.
February .	U.S.A.	1922 Semi-rigid "Roma"	This ship was re-engined by U.S.A. after she was received from Italy. An inexperienced crew flew the ship on full speed trials at the low altitude of 1,000 feet. One of the fins broke and the ship dived into a network of high - power overhead cables, which set fire to her.
July 3 . .	Italian	Semi-rigid	Fell into sea.
July 11 . .	Japanese	Non-rigid	Blew up in shed. Probably caused by an electric spark from the W/T gear setting fire to the petrol in the airship car.

AIRSHIPS

Date.	Nationality.	Type.	Circumstances of Loss.
October 12	U.S.A.	Non-rigid C 2	Destroyed whilst being handled out of the shed. The side guys pulled patches out of the envelope and the ship, crashing on to the side of the shed, was burnt. No loss of life.
June 8 . .	U.S.A.	1923 Non-rigid TC 1	Burnt through mishap on ground. No loss of life.
December 23	French	Rigid "Dix- mude" (L 72)	No definite evidence is available, but the official report states that the ship was struck by lightning. It should be noted that the ship was built specially for operations at high altitudes, necessitating hull weight being kept to a minimum. This meant the ship was structurally weak. Fifty-four killed. NOTE.—L 71, as sister ship to the "Dixmude," was handed over to the Air Ministry. The girder work showed serious signs of corrosion, probably set up by the action of dope used on the outer cover.
March . .	Japanese	1924 Non-rigid No. 3	Destroyed by gas explosion. Five killed.

AIRSHIPS LOST IN 1924-1926 97

Date.	Nationality.	Type	Circumstances of Loss.
September	U.S.A.	Non-rigid TC 2	Destroyed by bomb explosion at Langley Field.
September 3	U.S.A.	1925. Rigid "Shenandoah"	Structural failure in a line-squall over the State of Ohio; the storm was of exceptional violence. The U.S. Court of Enquiry found that the final destruction of the ship was due primarily to large, unbalanced, external, aerodynamic forces arising from high velocity air currents. Whether the ship, if entirely intact and undamaged, would have broken under the forces existing, or whether prior minor damage due to gas pressure was a determining factor in the final break-up, were matters which the Court was unable definitely to determine.
August 16 .	Italian	1926. Non-rigid N 2	The W/T airscrew driving the dynamo broke and tore the envelope open, the ship descending into the sea. Two drowned.

EXTRACT FROM AN ARTICLE IN
MECHANICAL ENGINEERING, FEBRUARY, 1926.

BY E. A. LEHMANN.

ULTIMATE FATE OF AIRSHIPS BUILT BY THE GERMAN
 ZEPPELIN COMPANY AND OPERATED BY GERMAN PERSONNEL.

I. *Ships put out of Commission while Intact.*

	No.	Per cent of Total.
1. Obsolete and dismantled after successful careers :		
The Zeppelins LZ 1, "Hansa," "Sachsen," Z 1, Z 2, Z 3, Z 4, Z 12, LZ 72, LZ 87, LZ 93, LZ 97, LZ 98, LZ 101, LZ 103, LZ 107, LZ 111, L 11, L 13, L 25, L 35	21	18½
2. Surrendered to Allied Governments after the Armistice :		
L 64 (a), L 71 (a) to England ; L 72 (b), LZ 113 (a), LZ 121 (c) ("Nordstern") to France ; L 61 (a), LZ 120 (c) ("Bodensee") to Italy ; L 30 (d) to Belgium (in parts) ; L 37 (d) to Japan (in parts)	9	9
<i>Note by Air Ministry :</i>		
(a) Dismantled. (b) Wrecked ("Dixmude").		
(c) Still existing. (d) Not re-erected.		
3. Destroyed by Crews in the Hangars after the Armistice :		
L 14, L 41, L 42, L 63, L 65, L 52, L 56	7	6
Total	38	33½

GERMAN WAR LOSSES

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II. War Losses.

	No.	Per cent. of Total.
1. Shot down by Enemy :		
(a) Hit by incendiary projectiles from artillery or airplanes during raids or scouting trips and burnt in the air (crews dead with few exceptions): L 7, L 21, L 22, L 23, L 31, L 32, L 34, L 39, L 43, L 44, L 48, L 53, L 59, L 62, L 70, LZ 37, LZ 77 .	17	15
(b) Heavily damaged by artillery, stranded or wrecked in landings on return from flight, mostly without injury to crew: L 5, L 8, L 12, L 15, L 19, L 33, L 55, Z 5, Z 6, Z 7, Z 8, Z 10, LZ 34, LZ 35, LZ 39, LZ 79, LZ 81, LZ 85, LZ 95 . . .	19	16
	36	31
2. Landed in neutral or enemy Territory (due to exhaustion of fuel, ships dismantled, crews interned or prisoners) :		
L 3, L 4, L 20, L 38, L 45, L 49, L 50	7	6
3. Destroyed by Enemy Action in the Hangars (no losses in lives) :		
L 9, LZ 38, L 54, L 60, L 46, L 47, L 51, L 58	8	7
	51	44
Total	51	44

III. *Losses due to Inexperience in Operating.*

	No.	Per cent. of Total.
1. Burnt in the Hangars (through carelessness with gasolene or hydrogen—few injuries): LZ 6, L 6, L 9, L 18, L 17	5	4½
2. Damaged in Ground or Hangar Manœuvres and dismantled (no injuries to crew): “Viktoria Louise,” “Ersatz Deutschland,” Z 11, L 24, L 57, LZ 90	6	5½
3. Damaged in landings (on account of navigational mistakes, and dismantled—few injuries to crew): LZ 2, LZ 4, “Deutschland,” Z 2, first “Ersatz Z 1, second “Ersatz ” Z 1, L 1, L 16, L 36, L 40, LZ 74, LZ 86	12	10½
4. Burnt in the Air (“valving” ship struck by lightning—crew died): L 10	1	½
Total	24	21

IV. *Losses due to Inexperience in Engineering.*

	No.	Per cent. of Total.
1. Use of Rubberized Gas Cells: The “Schwaben” was burnt while moored on the landing field due to a spark caused by frictional electricity set up by the flapping and rubbing of the rubberized fabric. (No loss of life.)	1	

SUMMARY OF GERMAN LOSSES 101

	No.	Per cent. of Total.
2. Insufficient ventilation of the Power Cars :		
The L 2 was burnt on a trial flight during ascent from ground due to hydrogen finding its way into a power car in coincidence with a back-firing motor. (Crew died.)	1	?
Total	<u>2</u>	<u>?</u>

SUMMARY.

	No.	Per cent.
I. Ships out of commission while intact	38	33
II. War losses	51	44½
III. Inexperience in operating	24	21
IV. Inexperience in engineering	2	1½
Total	<u>115</u>	<u>100</u>

CHAPTER X

H.M. AIRSHIP R 33

ON Thursday, April 16, 1925, H.M. Airship R 33 broke away from her mooring-mast at the Pulham Air Station and was driven by a westerly gale across the North Sea to the coast of Holland. Less than thirty hours later she was back in her shed, having returned there without any outside assistance, although her bow had suffered considerable damage. The incident was given wide publicity at the time, but is worth recording in some detail, because it provided a test of men and material at once so searching and so perilous as to mark an epoch in airship development. A trial of this description could never have been carried out in ordinary circumstances; an accident rendered it possible, and since there was neither loss of life nor injury to the crew, an invaluable experience was gained at trifling cost.

Many lessons have been learned from this mishap: wireless telegraphy and meteorology played a useful part in preventing its becoming a disaster; the designers and constructors of

the ship itself have at least the satisfaction that their handiwork has survived tremendous strains; and the nation may take justifiable pride in the officer and men who composed the crew, for they not only did their duty, but did it supremely well.

Before describing the events of the eventful thirty hours which followed the break-away, some preliminary explanations will not be out of place. The first is that the R 33 is an old ship, as airships go, and that she was not designed originally for mast-mooring, for the reason that at the time of her construction there were no mooring-masts. During the latter part of 1920, when the Pulham mast-head was erected, special mooring attachments were designed and the nose of R 33 was strengthened to receive them. Throughout the spring and summer of 1921 both the ship and mast were tested in all kinds of weather—gales up to 60 miles per hour, snow and hail storms. These tests revealed no signs of failure, but it is, of course, impossible to compare them with the conditions that prevailed when the airship broke away. On the latter occasion, violent gusts, of whose magnitude it is difficult to get an accurate record, made her roll heavily and set up different, if not severer, strains and stresses than those caused by a steady wind, however strong.

After 1921, experiments with the ship and

mast were discontinued until the summer of 1924, when, as part of a new airship development programme, R 33 was reconditioned and the Pulham mast refitted. In neither case was the design restressed. The trial flight from Cardington, the air station where the ship was reconditioned, to Pulham, where the mishap occurred, revealed no defect. Early in 1925, a new series of experiments was started, whose object was to try out thoroughly not only the airship but also the mooring-mast to which she was attached during long periods and in all kinds of weather.

For several days before the break-away the weather had been threatening, and at 7 a.m. on Wednesday, April 15, it was decided to put into force the bad weather organization; that is to say, a duty watch manned the airship, and a stand-by watch was held in readiness at the foot of the mast. Under this organization, the officer in charge of the watch on board has with him the latest weather report, and the ship is ready to fly at a moment's notice. Severe weather conditions prevailed through the 15th, so much so that Major Scott, the Chief Construction Engineer, spent the greater part of the day and some of the night of the 15th-16th on board the ship. At no time during this period was any anxiety felt as to the ability of the mast to withstand strains which the ship itself was riding out. Nevertheless, the mast-

head and guys were constantly inspected to see that everything was tight. On the morning of the 15th, such violent squalls struck the ship that the question of slipping her was considered. In these circumstances, she would either have had to lie off Pulham and await a favourable opportunity to return, or else to shape a course for the shed at Friedrichshaven, the nearest shed to leeward capable of receiving a vessel of her size.

Towards midnight of the 15th-16th, the weather commenced to moderate. At 3 a.m. on the 16th the ship was lying comfortably in a strong but steady wind, and Major Scott left her in charge of the officer of the watch. At 8 a.m. the crew and mast watches were relieved in accordance with routine, and Flight-Lieutenant Booth took over from Flight-Lieutenant Irwin. The new crew consisted of seven riggers, ten engineers and one wireless operator. About this time the weather again became squally. In his report Flight-Lieutenant Booth says:

“When taking over my watch, the wind was blowing 30-35 miles per hour from the west-north-west. The ship was riding steadily and in good trim. . . . At 9 a.m. the wind increased slightly, and 1,000 lb. of water ballast were let go . . . as the ship appeared to be slightly heavy on the bow pointer. . . . At approximately 9.40 a.m. a very severe gust was experienced. . . . This gust had no apparent effect on the ship, but during a subsequent gust,

a few minutes later, it was seen from the fore car that something had failed forward, as the mast was slightly on the port bow. The ship kept this position for a few seconds, and then broke clear. . . ."

The "something" which "had failed forward" was the movable arm on the mast, a portion of which the ship had carried away; at the same time a large rent was made in the outer envelope near her bow, which would have a tendency to extend when flying against the wind and thus to reduce considerably her speed. In the weather conditions then obtaining, this made an immediate return to Pulham and a landing there impossible; so R 33 drifted eastwards towards the North Sea. Fortunately, except for the torn outer cover and the displacement of two gas-bags, she was ready for flight in all respects, the requisite personnel, fuel, rations and wireless apparatus being on board. Almost immediately the engines were started and put slow ahead.

There are three laconic entries in the log of the flight which are more eloquent and descriptive than any paraphrase could be:

- Time 0950. Broke away from mooring mast.
- „ 0950. Let go 1,500 lb. of ballast forward, 1,500 lb. amidships and 1,500 lb. aft.
- „ 1005. All engines running slow. Course steered 260°. Course made good 80°. Ground speed 25 knots. Wind 260°, velocity 45 to 50 m.p.h. Height 2,000 ft.

ACTION TAKEN AFTER BREAK-AWAY 107

By the prompt, and indeed immediate, discharge of two tons of water ballast, Lieutenant Booth probably saved eighteen lives besides his own. Had this not been done when it was done, the ship could not have risen high enough to clear the adjacent buildings, and might have been dashed against them. Efficiency reaches its highest pitch when, as in this case, the right thing is done instinctively and almost subconsciously. The third entry describes a state of affairs which should strike the dullest imagination. The ship is being steered into the wind, but owing to the damage to her bow cannot make half her proper speed, and she is drifting astern, at a height of 2,000 feet, at the rate of 30 miles an hour, eastward, towards the North Sea, a desolate waste of waters lashed into fury by the gale.

During these first critical moments, neither those on board the R 33, nor those who watched her disappear in a dark bank of cloud, had time to give way to emotion. The practical way in which this appalling, if not wholly unexpected, situation was tackled, both on the ship and on the ground, reflected the greatest credit on all concerned. Wireless communication with the crew was established almost immediately; the naval stations on the East Coast were informed and, as usual, did everything in their power to help. The senior naval officer at Lowestoft put to sea himself in H.M.S. *Godetia*, and this vessel,

together with a destroyer, followed the airship on her eastward course.

At 10.30 a.m. on the 16th, R 33 reported the extent of the damage to her bow; this, after all possible repairs had been effected, would render progress against a strong head-wind at best extremely slow. There was, moreover, the unpleasant possibility that, unless the storm abated, the airship might drift so far to leeward as to render necessary a landing at some air station on the Continent, for the purpose of re-fuelling. Shortly after 12 noon, Flight-Lieutenant Booth reported that he had fuel for 24 hours flying, and that the ship was travelling through the air at 30 knots. As the gale had a velocity of 50 miles an hour from the west, this meant that R 33 was drifting astern and eastward at the rate of about 20 knots. Flight-Lieutenant Booth was advised by wireless to attempt to make good a north-easterly course, as from meteorological observations a diminution of wind speed was to be expected in this direction. He succeeded in following this advice with improved results. At 1.20 p.m., the course made good was slightly north of north-east, while the wind was just south of west and had dropped to 43 miles an hour.

As the day wore on, the gale shifted to the north-west and the course made good was to the south-east. At 6.15 p.m., the wind increased in violence to 55 miles an hour. A little later,

the town of Ymuiden, on the coast of Holland, was sighted. At 7.25 p.m., the Dutch coast was crossed; here the wind became more variable and, between the gusts, R 33 made, for the first time, a little headway. At 9.25 p.m. the Dutch coast was crossed again, but now R 33 was heading homeward, and making slow but steady progress in the teeth of a wind still violent but moderating. The log entry shows that the course laid and the course made good were at last the same, that the battered airship had overcome the north-west wind, in fact was going through it at a ground speed of 5 knots.

By 2.45 a.m. on April 17, the wind had dropped to 20 miles an hour, still from the north-west, and R 33 was flying almost due west at a ground speed of $18\frac{1}{2}$ knots. Shortly after 4 a.m., another north-westerly gale sprang up, the wind attained a velocity of 55 miles an hour and drove the airship astern in a south-easterly direction. At this period R 33 was being escorted by the *Godetia* and a destroyer. Fortunately for all three vessels, this spell of bad weather was of short duration; by 5 a.m., headway was again being made, though slowly.

At 6 a.m. the stock of petrol on board had been reduced to 780 gallons. At 7 a.m., while almost stationary, the airship rose to a height of 2,000 feet. By 9 a.m. the wind had dropped to 18

miles an hour, and the ground speed westward increased to 14 knots. This speed was maintained at a height of 1,000 feet until 12 noon, and shortly afterwards the English coast was sighted. At 1.25 p.m. that coast was crossed at Covehithe; at 3.20 p.m. R 33 landed at Pulham, and by 3.45 p.m. was secured safely in her shed.

Flight-Lieutenant Booth stepped out of the quarters he had occupied during the preceding thirty hours as though nothing extraordinary had happened. He was at once surrounded by a swarm of reporters and plied with questions, but seemed surprised to find himself the hero of the hour. No doubt, he was a little tired. An official report of his conduct reads as follows: "The action taken by Flight-Lieutenant Booth was prompt and in every respect correct; everything possible was done for the safety of his ship and crew." No eulogy could give greater satisfaction to a man of his type. He had done what was expected of him, and a great deal is expected from all members of the Royal Air Force.

Thus a long tussle with the elements ended in triumph for human perseverance combined with skill and courage, not to mention stout material and construction. Perseverance has been mentioned first, because to persevere on this occasion called for special qualities on the part of the commander. When over Holland, on that dark

stormy night, the temptation to take refuge in an air station on the far side of the North Sea must have been almost irresistible. To turn one's back on land at nightfall, and face that wild expanse of water in the teeth of a north-wester, not only demanded courage and stern resolution, it needed also a high sense of duty based on proper pride. The offers of accommodation were numerous and cordial, their acceptance could have been amply justified; but the young officer in temporary charge of R 33 conceived it to be his duty, for the honour of British aviation, to land his ship on British soil. He had confidence in himself and in his crew, and felt that if it were humanly possible to bring the airship home to Pulham, that was the course to take. And so he took it, notwithstanding many qualms.

From the entries in the log it might appear that the homeward flight was uneventful; fortunately, however, less prosaic narratives are available. It is related, unofficially, that before daylight on the morning of the 17th, R 33 sank so low that the sea-spray reached her, and all on board gave themselves up for lost. Then, miraculously, because nothing further could be done by human means to save her, she rose like a thing possessed of life and regained the upper air.

Stirring events excite the imaginations of even the most truthful eye-witnesses, and this

story may exaggerate the facts ; but to conclude that it is pure invention would be misleading. The air is a mysterious element, where tremendous and, as yet, incalculable forces are encountered. Scientists can predict the normal consequences of these forces, but not their vagaries ; to the latter the only guide is practical experience, acquired painfully, perilously, and often unexpectedly, by men like those who composed the crew of R 33. Air Ministry experts are constantly engaged in examining phenomena, some of which are unexplainable while others can be explained away, but from all of which something can be learned and turned to good account in the improvement of design.

So, twenty years hence, when giant airships circle the globe, transporting passengers at prodigious speed and in luxurious safety, may these fortunate travellers remember the anxieties, hazards, toil and perils of the pioneers of aviation. Nor should R 33 be forgotten. Like the *Matthew*, a Bristol ship manned by a Bristol crew, in which John Cabot sailed across uncharted seas to discover the continent of North America, she deserves mention on a monument. Since the day when she was taken from obscurity in a shed, patched, reconditioned and inflated, made the trial ship for innumerable experiments and fitted with every new device, she has had some crowded hours.

“Dreadful Airship Disaster. R 33 drifting helplessly across North Sea. Feared a total loss.” Such were the evil tidings flashed throughout the land one stormy April morning. Hearing the news, pessimists chewed the cud of mournful prophecy, and said, “We told you so.” And even optimists, looking up at the leaden sky while the wind shrieked among the house tops, were shaken in their faith. Later, official and less sensational accounts arrived—R 33 was drifting, but not helplessly, with Booth and his men aboard. She was struggling like a wounded bird above the waves that would engulf her, a huge rent gaping at her bow; sucked down at times, she rose again, still buoyant and indomitable, to battle with the gale. So ran the news, with variations, but always confident when the airship spoke, throughout a nerve-racking day and night.

After her ordeal, R 33 had a proud homecoming; a tragedy had been averted, a great exploit achieved. Her loss would have caused a set-back to the progress of airship development; her safe return marked a forward step in the conquest of the air. With luck she should have many years of useful work before her, for the old ship is flying still.

R 33. LOG OF FLIGHT. APRIL 16-17, 1925

Date.	Time.	
16.4.25.	0950.	Broke adrift from mooring mast.
	0950.	Let go 1,500 lb. of ballast forward, 1,500 lb. amidships and 1,500 lb. aft.
	1005.	All engines running slow. Course steered 260°. 21 kn. Course made good 80°. G.S. 25 kn. Wind 260° 45/50 m.p.h. Height 2,000 ft. ,
	1015.	Let go 500 lb. of ballast ford. and threw overboard main mooring wire. Hands employed repairing outer cover and securing Nos. 1 and 2 gasbags and shifting ballast aft.
	1025.	Crossed coast at Lowestoft. Height 3,000 ft.
	1120.	Course steered 290°. A.S. 30 kn. Course made good 40°. G.S. 24 kn. Wind 260°. 48 m.p.h. Height 1,500 ft.
	1147.	Course steered 270°. A.S. 30 kn. Course made good 69°. G.S. 19 kn. Wind 260°. 50 m.p.h.
	1320.	Course steered 290°. A.S. 30 kn. Course made good 33°. G.S. 21 kn. Wind 260°. 43 m.p.h.
	1405.	Course steered 270°. A.S. 30 kn. Course made good 72°. G.S. 16.5 kn. Wind 260°. 48 m.p.h. Height 1,500 ft. Threw overboard air cylinder and accumulators from fore car. Lost overboard box of engineer's spares and 4 fire extinguishers. Gas temperature 39°. Air temp. 38°.
	1547.	Course steered 310°. A.S. 30 kn. Course made good 164°. Ground speed 10.8 kn. Wind 315°. 40 m.p.h.

Date.	Time.	
16.4.25.	1815.	Course steered 302°. A.S. 30 kn. Course made good 142°. G.S. 25 kn. Wind 315°. 55 m.p.h.
	1825.	Sighted Ymuiden.
	1925.	Crossed coast 14 m. S.S.W. Ymuiden. Course 315°, A.S. 30 kn. Wind 315°. 45-50 m.p.h. Force of wind variable and ship alternately making slight headway and drifting astern.
	2125.	Crossed coast making slight headway. Course 315°. A.S. 30 kn. Course made good 315°. G.S. 5 kn.
	2325.	Sighted H.M.S. <i>Godetia</i> . Unable to close.
17.4.25.	0245.	Course steered 290°. A.S. 30 kn. Course made good 275°. G.S. 18.5 kn. Wind 315°. 20 m.p.h.
	0418.	Course steered 328°. A.S. 30 kn. Course made good 126°. 22 kn. Wind 315°. 50-55 m.p.h. Escorted by <i>Godetia</i> and one destroyer.
	0500.	Course steered 308°. 30 kn. Course made good 292°. G.S. 8 kn. Wind 315°. 24 m.p.h.
	0600.	780 glns. of petrol on board. Course steered 300°. A.S. 30. Course made good 278°. G.S. 6.5 kn. Wind 315°. 22 m.p.h.
	0700.	Making little headway. Rose to 2,000 ft.
	0730.	Second destroyer joined escort.
	0900.	Course steered 302°. A.S. 30 kn. Course made good 282°. G.S. 14 kn. Wind 315°. 18 m.p.h.
	1050.	Height 1,000 ft.
	1200.	Course steered 275°. A.S. 30 kn. Course made good 255°. G.S. 14 kn. Wind 295°. 18 m.p.h.

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H.M. AIRSHIP R 33

Date.	Time.	
17.4.25.	1215.	Sighted coast.
	1300.	Course steered 285°. A.S. 30 kn. Course made good 275°. G.S. 10 kn. Wind 295°. 20 m.p.h.
	1325.	Crossed coast Covehithe.
	1430.	Course as requisite for landing.
	1520.	Landed.
	1545.	Secured in shed.

CHAPTER XI

AIR TRAVEL

IN a letter to the *Guardian*, purporting to be written by an inventor, Addison satirized Aviation more than two centuries ago. The following is a characteristic passage :

“ I need not enumerate to you the benefits which will accrue to the public from this invention, as how the roads of England will be saved when we travel through these new highways, and how all family accounts will be lessened in the article of coaches and horses. . . . In short, Sir, when mankind is in possession of this art, they will be able to do more business in three score and ten years, than they could in a thousand by the methods now in use; . . . ”

That Addison was more of a prophet than he knew, has been proved by an American citizen during a recent visit to this side of the Atlantic. This gentleman takes a keen interest in aviation, and decided to see for himself how the air situation in Europe really stood. He set about his self-appointed mission in characteristically energetic fashion, traversed practically every air route in Europe, went by air to North Africa and Arabia, and covered 21,000 miles in fifty-

three days. The actual distance is not so important as the fact that there was neither rush nor strain at any stage ; that the traveller spent his nights comfortably in hotels or private houses, and had ample time for work and sleep ; that the flying time represented only a fraction, less than a quarter probably, of the fifty-three days ; and that every stage of this lengthy flight was carried out according to a time-table without a single hitch. The record of one period of forty-eight hours during this amazing journey is of special interest—Mr. Lester Gardner, for that is the name of this American discoverer, dined with the Aero Club in Moscow one night, with the corresponding institution in Berlin on the following night, and with the Royal Aero Club in London on the third night.

Incidentally, Mrs. Gardner accompanied her husband on a part of this trip. She had seldom, if ever, flown before, and suffered from the customary qualms, mental and physical, to begin with. But in her case, as in so many others, experience cast out fear ; nor did air sickness, and of this there is no authentic rumour, prevent her becoming an enthusiastic convert to the advantages and amenities of air travel.

The present writer has not yet enjoyed an experience so full and so prolonged. Some flights, however, linger in his memory. On one

occasion, he left his flat in London at 7 a.m., embarked on an airplane at Croydon, and a few hours later was present at a review of the British Garrison in Cologne; he then lunched in that city and, embarking once more in the airplane, reached Prague at 4.30 p.m. On the following day, he opened the British section of an Airplane Exhibition, had an hour's talk with President Masaryk, made a speech at a Gala Lunch, witnessed a tennis match between Czechs and Germans during the afternoon, dined with the Czecho-Slovak Aero Club in the evening, made another speech and went to bed. Next morning an early start was made, and Cologne was reached in ample time for lunch, after which the return journey to London was resumed and completed before the usual dinner hour. The total time of absence was just under sixty hours, the distance travelled exceeded 1,500 miles, with a minimum of fatigue and no dirt or discomfort.

At Cologne, an English lady, the wife of an officer in the garrison, asked for a lift to London. She had never been in an airplane before and was naturally nervous. But her child was ill, in England, and she seized the opportunity presented by a commodious not to say luxurious air conveyance.

While passing down the valley of the Rhine, the writer pointed out historic castles and other sights of interest on the great parti-coloured

map spread out below. But soon her attention wandered, she yawned suspiciously and then fell into unnatural fitful sleep. The worst had evidently happened. A handkerchief was passed as a mute token of helpless sympathy. Over Brussels, the symptoms became more pronounced, and the pilot was requested to land our passenger at Ostend. He urged, however, that a storm was brewing and that we ought to get across the Channel with the least possible delay. So, on we went. Over water, the motion of an airplane is much smoother, owing to the absence of air pockets; this smooth interval had a restorative effect, and when the airplane had swooped down through the mist enveloping the cliffs of Dover and landed on the airdrome at Lympne, the recent sufferer climbed out briskly and drank a cup of tea prepared by the caretaker's wife, who had been notified by wireless of our coming. It may have been the smell of English air, or the magic properties of that cup of tea, but whatever the cause of her recovery, on being told that a motor-car was waiting to take her up to London, the lady declined flatly to travel in such crawling fashion. Only the air was good enough for her.

Once more we climbed into the blue. The summer storm had spent itself; a radiant evening followed, the air was calm, the sky serene. Distant objects stood out with startling

clearness ; below us, parks, orchards and hop gardens made a gay green carpet, and earthy exhalations rose from the rain-drenched fields of Kent. Another convert to air travel, all her past sufferings utterly forgotten, arrived in London an hour later.

Air sickness is largely due to nerves ; the best preventive, as with sea-sickness, is not to think about it. Some people get sea-sick when they begin to pack their cabin trunks.

For purposes of pleasure and business travel, a practical type of airplane is the so-called "Amphibian," which can take off from and come down on both land and water. Most great cities have waterways ; they are either astride a river or on a sea coast, while some are on the shores of lakes. Hitherto, it has been necessary for a variety of reasons to locate landing-grounds outside the confines of the cities which possess them. This has increased the cost of air travel and involved a considerable loss of time. By the use of amphibians, air travellers will be able to arrive within walking distance of business and shopping centres, to moor their aircraft on a river, a lake or harbour, or run them up on beaches along a water front. Anyone who saw Sir Alan Cobham alight on the Thames at Westminster, at the end of his flight to and from Australia, will appreciate the possibilities of amphibians, whose chief and possibly sole defects are their weight and expense.

As a proof of the increasing popularity of air travel, the figures published recently by Imperial Airways Limited are worth quoting. In 1919, the average weekly number of air-borne passengers between London and Paris was 20 ; during the summer of 1926, the average number of those who travelled by air between London and the Continent was approximately 1,500.

As a proof of the increased safety of air travel, it should be noted that since the inception of Imperial Airways Limited, only one of the Company's aircraft has met with a serious accident. This accident occurred in December, 1924, and involved the death of seven passengers and the pilot. There have been minor accidents, of course, but without fatal consequences.

Up to the end of July, 1926, Imperial Airway machines had completed approximately 11,000 flights, representing a total of 1,968,370 miles flown. When these figures are compared with those available for British railways, in the early days of railway travel, the advantage is very decidedly with the newer form of locomotion.

When a wider range of speed has been attained, that is to say when airplanes can slow down from a hundred miles per hour in flight to twelve or even less for landing and taking off, Addison's mocking prophecy will be in a fair way to fulfilment. People will start from their gardens in

the country and land on city roofs, or from a sea front, lake or a river, to alight on some similar sheet of water, five hundred miles away, in a few hours.

New means of travel make people travel more; and once flying is established it will be cheaper. Just as the bicycle and motor-car gave city dwellers a new means of access to the countryside, so Aviation will extend the radius of excursion for the coming generation. This prospect may be viewed by some with mingled feelings; it certainly inspired Addison with misgivings. Commenting on the "Dædalists" of his time, he wrote:

"I am resolved so far to discourage it (Aviation) as to prevent any person flying in my time, chiefly by reason of the evil influence it would have in love affairs. It would fill the world with innumerable immoralities, and give such occasions for intrigue as people cannot meet with who have nothing but legs to carry them."

Here is, perhaps, the origin of aspersions, as frequent as they are unfounded, on the morals of our flying men.

Compared to the airplane, the airship is, or will be, a sober and even dilatory conveyance. Travellers will journey tranquilly in air liners to the earth's remotest parts, visit the archipelagos in Southern Seas, cruise round the coasts of continents, strike inland, surmount lofty mountain ranges, and follow rivers as yet half

explored from mouth to source. There will be much to see and more to learn, many mysteries to clear up. Our knowledge of air currents and air navigation is still limited; the detailed survey of vast tracts of land in Africa, Asia and America has yet to be undertaken. Explorers and scientists will find in modern "air balloons" that "composure of mind" which is essential for accurate observations. They will obtain a bird's-eye view of regions made inaccessible hitherto by deserts, jungles, swamps and frozen wastes, and will be able to pursue their studies, calmly and methodically, untrammelled by the limitations of terrestrial transport, high up above mosquitoes and miasmas, and mud and dust and noise. By means of the airship man will crown his conquest of the air.

To those who find statistics clear up their ideas, the table on p. 125, with a brief explanation, may be of interest:

RETURN OF MILEAGE FLOWN BY IMPERIAL AIRWAYS LIMITED.

Month.	1924.		1925.		1926.		Remarks.
	Mileage.	H.P. Mileage.	Mileage.	H.P. Mileage.	Mileage.	H.P. Mileage.	
Jan.	—	—	27,105	12,380,750	34,435	16,329,300	(a) Domestic trouble on inception of the Company.
Feb.	—	—	43,810	20,583,950	(b) 40,260	21,353,900	
March	—	—	54,670	26,156,450	55,635	31,022,775	(b) It will be observed that although the <i>actual</i> mileage is less than the preceding year, the tonnage (H.P. mileage), and consequent total carrying capacity, has gone up. NOTE.—In order to encourage the use of high-powered aircraft with a view to assisting the Company eventually to become self-supporting, it was decided in December, 1925, to modify the agreement by substituting for the minimum annual mileage of 1,000,000 miles (required to qualify for Maximum subsidy) a new composite minimum of 425,000,000 "H.P. Miles."
April	(a) 1,350	594,000	72,590	35,669,700	55,265	34,879,250	
125 May	(a) 46,590	24,590,100	112,355	58,343,575	(b) 81,430	59,799,750	
June	99,680	53,101,100	123,100	67,218,775	(b) 88,750	73,269,650	
July	146,820	75,206,370	84,985	45,882,650	107,500	84,500,000	
Aug.	139,280	70,702,880	82,815	44,476,550	—	—	
Sept.	110,345	56,861,380	81,445	41,635,825	—	—	
Oct.	72,175	35,856,360	58,350	31,239,450	—	—	
Nov.	47,280	25,680,720	34,355	20,001,625	—	—	
Dec.	36,420	18,448,100	29,720	16,986,750	—	—	
Total	699,940	361,041,010	805,300	420,576,050	463,275	321,154,625	

AN EXPLANATION OF HORSE-POWER MILES BY
ONE OF THE FEW PEOPLE WHO UNDERSTAND
THEM

1. The horse-power of Imperial Airways fleet, at the time when it was decided to vary the terms of the agreement, varied from 240 h.p. to 845 h.p.

2. If all the machines had been 240 h.p. and Imperial Airways had flown their full average of 1,000,000 miles, they would have flown 240,000,000 horse-power miles.

Similarly, if all their machines had been 845 h.p. and the fleet as a whole had flown the above-mentioned mileage, they would have flown 845,000,000 horse-power miles.

3. It will thus be seen that a figure of 425,000,000 horse-power miles represents a reasonable mean between these two extremes.

If the average horse-power of the Imperial Airways fleet is higher than 425 h.p., then, to achieve 425,000,000 horse-power miles, they need not fly 1,000,000 *actual* miles. To take an extreme (and impossible) hypothesis, if all their machines were of 850 h.p., then to fly 425,000,000 horse-power miles they would only have to fly 500,000 *actual* miles.

4. The *actual* mileage flown by Imperial Airways in the first year of operation represented 420,000,000 horse-power miles, on a basis of the horse-power of the machines actually com-

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prised during this period in their operating fleet.

Thus the 425,000,000 horse-power miles now stipulated for, represents a small advance on what was actually achieved during the first year of working.

5. The advantage of this horse-power mileage basis is, of course, that instead of having so many actual miles flown by small and hopelessly uneconomical machines, a less number of *actual* miles are flown, but on an economic basis with a *larger paying load carried*, i.e. an increase in the actual volume of commercial air transport.

CHAPTER XII

IN THE AIR OVER ARABIA

DURING his term of office as British Secretary of State for Air, the present writer paid a "flying visit" to Arabia in the month of October, 1924. The primary object of the trip was to inspect the Air Force garrisons in Iraq, but other reasons also rendered it advisable that a Member of the Government should visit this Mandated Territory. Turkish forces had entered recently the Mosul Vilayet and driven the Assyrian Christians from their homes; the situation on the Turkish frontier was confused, in fact the exact line had not been determined; a notorious Sheikh was causing trouble on the Persian frontier, and the action taken against him and his followers by the Air Force had roused misgivings in certain political quarters.

At 7 a.m., and under a cloudless sky, the journey by air began. The starting-point was Heliopolis, a suburb of Cairo and the Headquarters of the British Air Force in the Middle East. Two Vickers-Vernon airplanes conveyed the official party; in one of these were the

writer, his principal private secretary, a staff officer, a wireless operator and a mechanic, in addition to two pilots. There was ample space for the whole party with their baggage. The cruising speed was about 70 miles per hour, and during a great part of the flight an elevation of 6,000 feet above sea-level was maintained. At this height the air is refreshing and invigorating, however hot and dusty it may be below. Neither the noise of the engines nor the motion of a large airplane cause more discomfort than is experienced in a train or on board a ship. The traveller can read, write, sleep or survey the country spread out below in a spirit of detachment from earthly worries; although, on this particular occasion, constant communication was maintained, by wireless, with the accompanying and escorting airplanes as well as with ground stations on the route. There was only one fly in the amber—we were not allowed to smoke.

To a man who had been through the Palestine Campaign on foot and horseback, in stuffy trains and panting Fords, it was a striking illustration of the advantages of this form of travel, to see unfold itself below the long and weary route by which, six years before, the British troops had passed. From Cairo to the canal of Suez, the air route runs north-east, then, after skirting the Bay of Pelusium, it strikes almost due east above the desert, the sight of which brought

back old memories of mules and camels, dust and heat and smells and thirst. Jerusalem, which once had seemed so inaccessible and far, was reached in a few hours. The Holy City had been surrendered in storm and rain, now it was bathed in sunshine and looked inviting amid the barren hills. Unfortunately, we had not time to land there on the eastward journey, and travelling high above the Mosque of Omar were soon above the tangle of ravines between the Mount of Olives and the Dead Sea. The first halt was made beyond the Mountains of Moab, at a small air station on the western edge of the desert, where the party was transferred to small machines and taken to Amman, the capital of Trans-Jordania, in time for a late lunch.

Here there was some official business to transact, which occupied the entire afternoon. That night, the Emir Abdullah, the titular ruler of Trans-Jordania, gave us a ten-course Arab dinner in a tent pitched on the hill side. His Highness is the younger brother of King Feisal, the monarch of Iraq; he is no great linguist but a reader of the stars. When asked about the weather on the morrow, he gazed at the firmament for a minute and prophesied the wind we wanted, and the most fickle of all winds, out of the west. Unlike most weather prophets, he proved right.

Early next morning the journey eastwards

was resumed. Our course now lay across the Arabian Desert, a vast and desolate tract of country with something sinister in its aspect. A line of oases lies to the north of the air route after leaving the confines of Trans-Jordania; but later, a waterless belt of basalt rocks is crossed, beyond which and up to the valley of the Euphrates extends a sandy waste. Across this region a furrow has been cut which is clearly visible from the air; it is the pilot's guide across the Desert, and along it, at intervals of from twenty to thirty miles, landing-grounds have been prepared. At some of these desert stations stores of fuel are concealed; they have to be hidden carefully, as the Arabs are notorious thieves and many of the chiefs possess Ford cars. It is a strange experience to descend, from a height of several thousand feet, down to the heat and blinding dazzle of that dusty plain; there to perceive that the machine is a few feet from a block of concrete with a metal cap; then to watch the pilot unlock and unscrew this cap, reveal a buried cistern and extract from it a fluid, brought from hundreds of miles away, which in the circumstances is more precious than water in a wilderness.

We reached Baghdad in the early afternoon. Close upon thirty airplanes came to meet us and formed a most imposing escort for the last stage of our eastward flight. In perfect formation escorters and escorted passed above the

city on the Tigris, and after wheeling right about landed on the airdrome at Hinaidi. The writer stepped out to find himself about thirty yards from a Guard of Honour, and surrounded by high officials who had come to greet him. His style was not a little cramped by a loud buzzing in his ears, due to the sudden increase of air pressure.

A short stay in Baghdad was devoted to inspections and visits to King Feisal and other dignitaries. A trip to Mosul formed the next item on the official programme. The distance from Baghdad is about 220 miles by air; after an early start in the cool of the morning, we reached the second city of Iraq in time for breakfast. More inspection work followed, and during the afternoon several visits were received and paid.

Mosul is picturesquely situated on the Tigris and should be quite a pleasant place to live in during the winter months, and when there is more water in the river. Its population is very mixed. At a reception during the afternoon, the representatives of no less than five religions were presented, each one of whom claimed a rank equivalent to that of bishop. The high priest of the Devil Worshippers was not one of them. A company composed of members of this sect had been seen on parade; they were described as good soldiers and strict in their religious observances, and they certainly looked

fierce enough and very much in earnest about something.

On the following day the party flew from Mosul to the Turkish frontier, crossing a range of mountains on the way. The frontier here follows a winding river with many islands; on one of these is the principal town of the district, built there originally for security. Against modern weapons, this city is no more a refuge, but is none the less on a charming site, which no æsthetic airman would care to bomb. This part of Arabia is mountainous and rugged, but there are many fertile valleys, well watered, in the summer months, by melting snow, and throughout the year by copious springs. Here the Assyrian Christians dwelt in peace until they were expelled by the revengeful Turks.

From the frontier we went to Erbil, better known to scholars as Arbela, where Alexander the Great fought a famous battle. Thence, in the course of the afternoon, to Kirkuk, a Turcoman city and the seat of the Chaldean archbishop, where we spent the night.

Before returning to Baghdad, an early morning flight was made to Sulaimaniya, a town close to the Persian frontier and on the caravan route to Teheran. The normal population of this town is over 20,000, but in August, 1924, it had been raided by a notorious Kurdish sheikh named Mahmoud. Only 800 of the inhabitants had dared to stay in their homes, the others fled

to the mountains or across the desert towards Baghdad. Over 1,000 of the old men, women and children perished by the way, trade ceased, the fields were left uncultivated, and the activities of the entire district were paralysed. Mahmoud was summoned to surrender, but paid no attention to the civil authority. Eventually, after repeated warnings had been given, air action was taken against the marauders, and they were bombed out of Sulaimaniya. Less than a dozen of them were killed by the bombardment, and a few houses were laid in ruins. As a result, Mahmoud became a refugee in his turn, and the town was reoccupied by Arab levies, supported by a detachment of the Air Force.

By October, 1924, 12,000 of the inhabitants had returned, the shops in the bazaar were full of goods, and "business as usual" was the order of the day. We were given an enthusiastic welcome, and the writer received three delegations—one from the notables of the city, another representing the Persian merchants; the third consisted of Kurdish sheikhs, some of them relatives of the brigand. The first delegation expressed its gratitude for the restoration of law and order; the second for the resumption of trade; while the sheikhs, if not grateful, were respectful and resigned to a state of affairs in which law and order, being inevitable, were maintained by the British. All three delega-

tions agreed that the punishment of Mahmoud had been well merited, and as effective as it had been prompt. Air power appeals almost as much to wonder as to fear; but if it is used with discretion and restraint, it will serve as an instrument of peace.

Two days later the return journey to England was commenced. Like the outward journey it was completed without a hitch. There was something uncanny in the way these enormous distances were traversed according to a carefully worked out schedule. We dined and slept at Amman once again, passed the second night on the summit of the Mount of Olives at the residence of the British High Commissioner. On the third day we lunched at Heliopolis, and flew thence to Aboukir Bay, close to Alexandria, arriving in the latter city in time for a sea bath. On the following morning, the writer was received in audience by King Fouad of Egypt at the Summer Palace, and at noon embarked on the steamer for Trieste.

London was reached in three weeks to a day from the date of departure. During that period many thousands of miles had been traversed, nearly 6,000 of them in the air. But the actual distances are not so important as the fact that the tour over Arabia would have occupied several months, and involved great discomfort and fatigue, not to mention risks, by any other existing means of travel.

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To readers of ancient history aviation offers a new prospect. They can now see with their own eyes the ruins of Babylon, Nineveh, Palmyra, Ur of the Chaldees, rose-pink Petra and Hatra, where Parthian emperors held sway, within a week of leaving any capital in Europe. The desert is no more a barrier; on the contrary, its surface is suitable as a rule for landing-grounds and provides a convenient highway for riders of the air.

CHAPTER XIII

AIR ROUTES

AN air route is a chain of stations which, for airplanes, correspond to the garages on main roads, and for airships, to dockyards, harbours and ports of call. It is a link between earth and the upper air, through which the aviator should be able to receive weather reports by wireless, guidance in fogs, and in which he, or she, can find a refuge in case of trouble. Air routes should be clearly visible from the air; this is, of course, impossible in foggy weather, when the aviator must be given his position by wireless signals, but they should be well lit up at night.

Well-appointed air routes are indispensable for the development of aviation; they encourage flying by diminishing risks, and have on several occasions been the means of saving life. Such routes should be shown clearly on modern maps.

Air routes fall naturally into three categories :

- (1) Airplane Routes.
- (2) Airship Routes.
- (3) A combination of (1) and (2).

Of the first category many exist already; they are over land and narrow seas, although on some of them wide sea spaces are now being crossed. The average pilot, however, is not happy over water, his proper element is over *terra firma*. Already routes of this description link up the European capitals, including Moscow, with one another and with Northern Africa, Arabia, and the Persian Gulf. They are in process of being extended; a regular service between London and Bombay, and thence to different parts of India, will be established shortly; the section between Egypt and Karachi should be opened in 1927.

Many other routes have been surveyed. Sir Alan Cobham has added to the long list of his achievements by flying from London to Australia; the route from Cairo to the Cape has been traversed by several types of machine, including those belonging to a regular Air Force squadron; another Air Force unit has flown from Cairo to Nigeria, a distance of over 6,000 miles, in eighty flying hours. Thus, in many directions and to the most inaccessible localities, trails are being blazed. Every year produces some new improvement, and marks progress in the direction of increased reliability and endurance of airplane engines. A continuous flight of over 3,000 miles has been accomplished. There seems to be no limit to the courage and skill of airmen, and the enterprise

of constructors. It can only be hoped that the public will learn to appreciate the magnitude of their achievements, and reward them by taking advantage of their efforts.

Airship routes will be mainly sea routes. Over land, the airship is slower than the airplane and not much faster than an express train; over sea, it will travel twice as fast as the fastest steamer, and at a lower cost. The first regular passenger airship routes will probably be over the North and South Atlantic. Owing to the fact that the surface of the sea, even in the tropics, maintains a fairly even temperature, atmospheric disturbances are less disruptive to an airship than those encountered over land in tropical or semi-tropical climates. Vertical gusts are generated over sun-baked plains which may attain a velocity as high as 1,000 feet per minute, and carry an airship two or three thousand feet upwards in a few minutes, with a corresponding and sudden decrease in air pressure. It was a gust of this description which caught the ill-fated "Shenandoah" and broke her rigid framework in two places. Only the stronger structures can withstand the strains and stresses thus set up, and to provide the necessary strength, with the material and devices actually available, may involve an increase of weight which, if not prohibitive, might reduce unduly the "useful" load. That these difficulties will be overcome eventually there is no

doubt; but with the first passenger airships no chances should be taken, every conceivable risk must be foreseen, and every precaution taken to make assurance doubly sure. Another disaster like that which befell the "Shenandoah" would delay development for many years.

A fascinating field for speculation is opened up by the consideration of airship routes. These vessels expose a large surface to the action of the wind, and their navigation will in many ways resemble that of sailing ships. Consequently, in certain parts of the world, where there are strong and steady prevailing winds, circular courses which follow those winds will be preferable to direct great circle routes between two widely separated points. To drive an airship into a forty-knot head-wind would halve its speed, cause discomfort to the passengers and crew, and strain the ship unduly without a compensating gain in time. The longer way round may often be the shorter route to a given destination.

A typical circular course might be from England to Cape Verde, on the extreme west coast of Africa, thence to Canada and back direct to England. Over nearly the entire length of this route, and practically throughout the year, the prevailing winds are following, and a speed of 100 miles an hour could often be attained. Another circular course is to be

found between the Cape of Good Hope and Australia. On the outward journey, by going as far south as the 45th parallel of latitude, an airship would enter the "Roaring Forties" and be simultaneously blown and propelled eastwards at a rate approaching 120 miles per hour. The return journey would be made on a course some 1,200 miles to the north, under somewhat less favourable conditions of wind.

The foregoing are only general indications, the writer having neither technical knowledge nor experience of the art of navigation. But it will be obvious to anyone who has travelled, that these factors must be taken into account in determining airship routes. Moreover, by thinking ahead and taking expert advice upon these matters in good time, a great deal of money will be saved and airship traffic from the outset will be put upon a proper basis. Unquestionably, it has got to come, and will from its very scope and nature be an international business. But the nation which is best prepared, has the best ships and the most carefully worked out plans, will get, as it deserves to get, a long start.

The third category of air routes will come into existence automatically, when the other two systems have been more developed. Airships will disembark their passengers at a terminal station or a mooring-mast, and these will then proceed to their destination by branch airplane routes. It may even be made possible for

airships to receive passengers from airplanes while in flight. These routes will follow those already traced, and will demonstrate the complementary uses of the different types of aircraft.

For a Government there is no more natural and effective way of encouraging aviation than by the establishment and maintenance of air routes. A nation which neglected its ports and harbours, failed to light its coast-line properly, or did not repair its roads, would be considered foolish and short-sighted. But in all countries, these charges are borne by the general public, either as taxpayers or ratepayers; they do not fall upon a single industry.

Although the initial cost of air routes may be considerable, if private companies and persons paid for the use of landing-grounds, as they now pay harbour dues or garage costs, these properties would become not only self-supporting, with the development of aviation, but the money spent on them would prove to be a good investment.

There is more in air routes than their purely commercial uses. If developed on the right lines, they should become great international highways, along which the aircraft of all nations will pass and meet, like ocean-going ships; only the traffic will be speedier, and the intercourse closer and more intimate. They will confer a power and mobility in defence, which

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will restrain aggressive action so swiftly and impressively as often to nip it in the bud. Such are the prospects opened up by air routes ; and each nation which wishes to contribute something to these international benefits should remember that charity begins at home.

CHAPTER XIV

THE BRITISH EMPIRE AND AVIATION

SEA POWER AND AIR POWER

AVIATION presents a serious menace and at the same time offers a splendid opportunity to the British people. No people has more to gain by its rational development, or more to lose by its neglect. Our position in the world has been built up on the basis of sea power, and suddenly, within a few short years, air power has been developed on a scale which renders it the dominating factor in the defence of the heart of the British Empire. On the other hand, this new form of locomotion, man's latest achievement in the field of progress on its mechanical side, and one to which British aviators and designers have made such valuable contributions, if properly and fully utilized, will serve to knit together, far more closely than has been possible in the past, the scattered peoples of the British Commonwealth, will bring into existence and sustain an Empire-wide air transport system, with an aircraft industry to supply its ever-growing needs, and thus will

consolidate Imperial Defence while promoting prosperity and peace.

One of the chief tasks of the British people in the immediate future is, therefore, to develop aviation in all its branches. For the accomplishment of that task, they will have to re-adjust many old and fixed ideas, but this need not involve the sacrifice of the traditions of a seafaring race. Indeed, the more closely the development of our air power is modelled on the processes by means of which England became the "Mistress of the Seas," the better for the British Empire.

Admiral Mahan, in his famous book, *The Influence of Sea Power upon History*, enumerates the five principal conditions affecting sea power; of these, the fourth and fifth are the Character of the People and the Character of the Government respectively. In regard to national character, he affirms that aptitude for commercial pursuits is a distinguishing feature of nations that have been great upon the sea, and that the growth of sea power in its broadest sense depends upon "bold enterprise in the pursuit of gain, and a keen scent for the trails that lead to it." Of Governments he says:

"Whether a democratic Government will have the foresight, the keen sensitiveness to national position and credit, the willingness to ensure its prosperity by adequate outpouring of money in times of peace, all of which are necessary for military preparation, is yet an open question."

The reference has been made advisedly, because it is only necessary to substitute the words "air power" for "sea power" in Mahan's text to make it applicable to the present situation. No difference in principle exists; it is only in the artificial conditions under which air power first became apparent, that a contrast is to be found.

British sea power was built up gradually. As our colonial system grew, our war fleets grew with it, until "England was *the* sea power; there was no second." Since the days when this remark was true, a formidable "second" has appeared, and disappeared. Later the Washington Conference laid down a scale for naval armaments with Britain equal first, and to this extent our sea power has been limited. But though less flagrant and outspoken, the rivalry for world power continues, and with it a not less fruitful cause of armaments—the quest for security based on force. Air power is now essential for security; a new weapon has been devised which can be put to more destructive uses than either fleets or armies by competent and unscrupulous men.

Air power has not yet reached its full development; the final stages of the World War gave a mere inkling of its potentialities. Its growth, unlike that of sea power, has been sudden and prodigious. The war stimulated airmen and inventors, quickened production artificially,

brought into being lavishly equipped air forces and new factories manned by an army of skilled mechanics. Once roused, the British rose to the occasion. A great national and imperial effort made Great Britain *the* Air Power.

With the cessation of hostilities, however, a reaction came. Neither the Government nor the people had fully grasped the lessons of the war. The naval and military authorities, who had at first been disconcerted by the new weapon, reasserted the claims of the senior fighting services. As a consequence, the Royal Air Force was cut down to dangerously low proportions, a high percentage of its personnel was disbanded, and vast quantities of valuable war materials were either sold for next to nothing or scrapped. At the same time, and this was much more serious, public interest in aviation waned. Marvellous exploits by British airmen, such as the flight of the Smith brothers to Australia some six years ago, were regarded as feats requiring skill and courage, but not as serious contributions to a new form of locomotion. The people looked askance at flying. Fear of accidents deterred many, who imagined they would be exposed to the same risks as military airmen during training. Air travel was expensive and confined to enthusiasts and the venturesome who were also well-to-do.

Fortunately, a marked improvement in all these respects has taken place during the past

two years. To-day, the Royal Air Force is second to none in efficiency and is building up steadily, so far as present circumstances permit, the right kind of reserves. More people fly, as is shown by the number of passengers carried by Imperial Airways Limited. Immense crowds flock to see Air Force displays, and our airmen get their proper meed of recognition. The practical value of long flights is beginning to be appreciated; the reception accorded to Sir Alan Cobham in Australia, and the interest and enthusiasm displayed on his return to London, are welcome indications of the advance of aviation in popular esteem. Last but not least, considerable progress has been made with the local development of air transport services in Australia and to a less extent in Canada.

But much remains to be accomplished by both the Governments and the peoples of the British Commonwealth. It is the duty of the former to look ahead, and realize, in the words of the *London Times* already quoted, "the important part that aviation must inevitably play in shaping the destinies of our race"; to perceive that air power is as necessary to the maintenance of the British Empire as sea power was to its establishment; to grasp the significance of this new weapon, not only as a means of defence against aggression, but also as a potent instrument of peace; to so develop it that it shall become irresistible, a strong arm

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to be used for upholding law and order, and not abused by permitting it to extend the area of conflict, or to exhibit what Macaulay has described as "the most frightful of all spectacles, the strength of civilization without its mercy."

It is equally the duty of the British people to face the new situation in a progressive spirit, and not to cling tenaciously to old ideas. The British Isles are small in size and offer little scope to aviation; but the Empire provides a limitless field for enterprise in connection with air transport. As a race we have hitherto regarded the sea as our special province, and the national character has lent itself to the sea habit. We have won a great and dominant position as a nation by controlling the "illimitable pathways of the sea," and these are still the backbone of Empire communications. But the air provides a new system of arteries and veins, and we will neglect them at our peril. To preserve our position in the world, we must develop the still more illimitable pathways of the air, and cultivate the air habit.

THE FOUNDATIONS OF AIR POWER

An Air Force is a manifestation of air power, but the foundations of that power are to be found in commercial and civil aviation, with a national aircraft industry adequate to their needs.

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Owing to the rapid and artificial development of aviation, the proper relationship between industry and air armaments has not, so far, been established in any country. In Britain, France, Italy and the United States, the aircraft industries depend to an undue extent on orders placed by Government departments. This state of affairs may be inevitable for the present, but is essentially unsound, and if uncorrected must be a source of weakness. It is as though British shipyards were kept going almost exclusively by naval construction, or as though our engineering works turned out more tanks than locomotives. An industry so situated exists precariously, and does not play the part it should in a nation's life. To put the British aircraft industry on a sound footing, an Empire-wide air transport system is required as its chief market. Given this, that industry would become a source of profit to its promoters, a nursery and a means of livelihood for thousands of pilots and mechanics in time of peace, and form a natural air force reserve in time of war.

Certain small European States possess no aircraft industry at all, but still maintain air forces. These buy their airplanes abroad and import mechanics. For the reasons given in Chapters II and VI, air forces so constituted are of little value, they are the shadow without the substance of air power; even if they should be efficient at the outbreak of hostilities, they

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could hardly survive more than the first few weeks of air fighting.

In Germany, on the other hand, a different air policy has been imposed. There, under the terms of the Treaty of Versailles any kind of air force is prohibited. Consequently the money which in other circumstances would have been spent on air armaments is devoted to encouraging commercial and civil aviation. As a consequence, the Germans, in spite of many difficulties, have succeeded in creating a flourishing aircraft industry, and may thereby gain control of several continental air routes. If other nations, through lack of enterprise, let this happen, in spite of the possession of large air forces, they may find themselves at a disadvantage as compared with Germany, whose ultimate air power, though less apparent, will be better founded and more real.

It is neither desirable nor possible to curb the progressive activities of an efficient, far-sighted people; the more logical course of action is to follow their example, or better still, to give a lead. In the cases of the British Empire and the United States, no valid excuse could be put forward for being out-distanced by the Germans in civil and commercial aviation; since they both have greater resources than Germany possesses, and every inducement to display at least equal energy and vision.

EMPIRE AIR DEFENCE

In spite of the rapid progress made in aviation, for some years to come the Great Dominions of the British Commonwealth will be immune from serious air attack. War between the English-speaking peoples is unthinkable; and the cities of Canada, Australia, New Zealand and South Africa are not yet within striking distance by air of any existing, and conceivably hostile, air base.

Aircraft carriers, both sea-going and aerial, will, with improvements in design, be utilizable as mobile air bases and thus extend the range of air attack. But their uses as such have still to be developed, and although it is always necessary in air matters to look well ahead and be prepared for the unexpected, those responsible for Empire Air Defence can afford to disregard this menace, for the present, and frame their policy to meet more urgent needs.

In the event, however, of another European War, few of the larger cities in the British Isles would be out of range of hostile aircraft. If such a calamity should occur, air fighting would begin at once, and the bombing to which London and other cities were exposed during the World War would seem, in retrospect, like child's play compared to what could be effected, in the way of destruction of life and property, by a first-class Continental air force. Fortu-

nately, the prospect these words suggest is becoming more and more remote; but while there is the slightest risk of Europe again lapsing into strife, no responsible British Government dare neglect the requisite preparations for air defence.

It follows, therefore, that in drawing up a scheme for Empire Air Defence, the protection of the British Isles from attack by air must be the first and principal consideration. Air forces are needed in the Great Dominions for local defence against minor air raids, in co-operation with the naval and land forces; also, provision will have to be made for guarding Empire air routes, when they have been established. These are, however, secondary matters compared to Home Defence.

Home Defence is the chief function of the Royal Air Force. All the other functions of that force, such as co-operation with the Fleet and Army, the policing of Iraq and safeguarding European interests in the Middle East, however important they may be, are subsidiary. If the heart of the Empire were to stop beating, the limbs would soon decay.

How easily such a disaster might occur, a moment's reflection will suffice to show. There is no mobilization period in air warfare. The first attack by air upon these islands would coincide with, if it did not precede, the formal declaration of war. Failure to check the enemy's

bombing squadrons might cause a state of panic in densely populated areas, which, to say the least, would be embarrassing. Defeat in the first aerial encounters, if it were followed by marked inferiority in the air, would expose our dockyards and military centres to incessant bombing, and thus reduce the other fighting services to temporary impotence. The course of the war might be determined during the first ten days. The initial phase might be decisive.

To meet the menace of air attack, a new defence system has been rendered necessary, whose first line is the Royal Air Force. Inevitably, the new organization has been criticized, if not condemned. It cuts across sentiment and tradition, like every other innovation; it encroaches, supplants, poaches on old preserves, and will, if it is properly applied, sacrifice the hoariest vested interests to efficiency and economy. Some of the criticism has been constructive, and as such welcome. There is always a tendency to go too fast in the exhilarating atmosphere of new ideas. But many critics have displayed either ignorance of or unwillingness to face the facts of the present situation.

Any scheme of Empire Air Defence must be based on co-operation between the three fighting services. As air forces, because of their cheapness and effectiveness, tend increasingly to replace land and sea forces, many delicate

questions of command will have to be settled. In matters of this kind, decisions cannot profitably be based on actual conditions, they should take into account conditions, so far as they can be foreseen, at least ten years ahead. Thereby, money is saved, the bickering between departments is forestalled and to some extent mitigated. It is, or by now should be, axiomatic, that where a large air force is required, to put it under the control of men, however competent in other respects, who do not understand its functions, is always wasteful and will often prove to be disastrous. Responsibility for air operations should never be divided. Air tactics are so different from those on land or sea, that only in special circumstances is it possible to combine them; to subordinate the action of units with the mobility of air squadrons to that of units on land or sea is to harness Pegasus to a cart.

Stress has been laid upon these points because they have a direct bearing on the air defence of the Empire. Air strategy is at present nebulous, and will remain so until both Empire and world air routes have been established. If there should be another European war in the immediate future, the Royal Air Force in these islands will fight the first phase alone. During the later phases, British air power will reach its full development with the co-operation and assistance of the Great Dominions. Their readi-

ness to reinforce may be taken for granted, but their co-operation will be more prompt, and therefore more effective, if airmen in all parts of the Empire have been trained on the same lines, are accustomed to the same types of machine, and if their services can be utilized, not in haphazard fashion, but in accordance with a carefully worked out plan of Imperial Defence.

“ LONG HOPS ”

Perhaps the most impressive feature of recent developments in aviation is the steady increase of the length of non-stop flights. Admittedly, the more sensational performances are *tours de force* by exceptional men in exceptional machines; but even so, they have great practical value. The fact that any airplane can remain more than thirty hours in the air, and travel 3,400 miles without alighting or re-fuelling, is sufficient proof of endurance, both human and mechanical, to justify the expectation that, in the near future, commercial and military airplanes will be designed capable of covering at least half that distance in so to speak a single “hop.”

With the advent of “long hops,” aviation will begin to assert itself as a means of locomotion and will acquire full commercial status. On stages of from 300 to 500 miles, although the gain in time is considerable, over even an

express train service, it is not yet great enough to make the air route the only possible route for anyone in a hurry. Many people will discover some excuse for going by road or rail or sea, when by so doing they waste only half a day. But when passenger airplanes are available which can fly by night as well as day, and reach a destination 1,500 miles away, on the far side of an ocean and several frontiers, in from fifteen to twenty hours, the gain in time will amount to several days, and become a decisive factor. Air travel then will more than hold its own with any other form of travel, at least for officials and business men.

British aviation has everything to gain by long-distance flying. Indeed, it is no exaggeration to say that Empire air communications cannot be properly developed, or play the part they should play in commerce and defence, on any other basis. These islands, situated as they are on the outskirts of Europe—the shortest straight line across which exceeds 600 miles in length—with the Atlantic Ocean between them and the continent of North America, are cut off from direct, all-British air communication with the Great Dominions, and will remain so until the range of British aircraft has been considerably increased.

Admittedly, the British air transport system should be, and inevitably will be, closely associated with the French, German, Italian

and other Continental systems; but its co-operation with those systems will be more traditional and more effective if it is based on independent imperial air communications, embracing not one continent but all continents, not limited to narrow waters, but reaching out to the world's remotest parts above the Seven Seas.

We British can never escape the sea. We must either go on it, or under it, or over it, to overcome the disabilities of our geographical position. That position does not confer immunity from air attack, and it will cramp our activities in the air unless we tackle the problem of air transport on big imperial lines, or, in other words, "long hops."

For the purposes of the immediate future, a "long hop" may be taken as 1,500 miles in length. One such hop would cover the distance from the south coast of England to Malta, a second would reach Egypt, a third Bushire (on the Persian Gulf), a fourth India, at Karachi or Bombay, a fifth Ceylon, a sixth the Straits Settlements, a seventh Port Darwin in Northern Australia; three more would reach New Zealand. Thus, in ten "long hops," or ten days and nights, the traveller and the mail bag out of England would arrive in the most distant of our dominions without landing at an air station which was not either British or under British control. The advantages of such a

service are obvious—for mails no other means of transportation could be considered even; for passengers, improvements in design will render travel in an airplane comfortable if not luxurious, and few who make the journey under existing conditions could be indifferent to the gain in time.

From a strategical point of view, this development will be even more significant. Imperial air strategy will lack coherence while it depends on air stations which are either potentially hostile or even neutral. Empire air defence must eventually be based on air routes in which there is no neutral link, whose stations will, in many cases, be separated by wide ocean spaces.

These conditions impose the employment of seaplanes or amphibians; airmen prefer flying over land in heavier than air machines which can float, to flying over sea in ordinary airplanes. So far as these types of machine are concerned, the men and engines are available already to form a nucleus and make a beginning. Organization, enterprise, foresight, research, careful study of and training in aerial navigation, and the applications to it of wireless telegraphy, are now required to make what, at first sight, seems impracticable and almost fantastic a reality.

Airships will undoubtedly play an increasingly important part in Empire air communications. To a layman, the possibilities of this branch of aviation appear incalculable. Once the relia-

bility of airships has been demonstrated, a new era will commence in transportation. R 101, with its hundred sleeping berths, is but a rude and primitive forerunner of the luxurious air liners which will be designed. These vessels will have a range of flight unattainable by the airplane and at least twice the speed of the fastest ocean-going steamer; they will take a pay-load as heavy as that of an ordinary train across lofty mountain ranges, and convey passengers to Australia or Peru in a third the time taken now and at a lower cost. If "long hops" are the secret of air transport, the future of commercial aviation is very largely with the airship.

There is no need, however, to institute comparisons between the different types of aircraft. The airship and the airplane are the complement of each other, they will work together on the world's airways and play their respective parts in the conquest of the air.

STATE AID FOR AVIATION

While the direct aid of the Dominions will be invaluable, indirectly they can do even more. A wider scope for their activities is to be found in the field of air transport and commercial aviation. But these, at least in the early stages of development, will require State assistance.

As has been pointed out in a previous chapter, the most obvious and direct way in which a

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Government can encourage aviation is to subsidize either the national aircraft industry, or air transport companies, or associations of manufacturers and financiers representing both. Admittedly, there are objections to this method. To many people the word "subsidy" is like a red rag to a bull; they contend that no healthy industry needs a subsidy, with the possible exception of their own, if they happen to be interested in one, and even then, in certain cases, sound principles prevail. The contention is unanswerable, but, unfortunately, there are industries which are not in a healthy state and yet are indispensable to progress.

Through no fault of those responsible for its conduct, the British aircraft industry is in this latter category. Its inception was due to the efforts of a small band of indomitable pioneers, who foresaw the possibilities of aviation and went on with their experiments, in spite of risks and losses, while the majority of people doubted. When the war came, this puny weakling among industries was thrust into a forcing-house and fed to repletion with orders from the fighting services. During the war years, it waxed fat prematurely; but with the cessation of hostilities, another spell of lean years came. After such vicissitudes it is not surprising that the manufacturers of aircraft, and those associated with them, should find it difficult to put their business on a healthy

footing. Unless the lavish expenditure necessitated by the War is followed, in the words of Mahan, "By adequate outpouring of money in times of peace, all of which are necessary for military preparation," what was said of Machiavelli will be true of this all-important industry: "Untimely decrepitude was the penalty of precocious maturity."

This is a state of affairs which no Government or people in the British Commonwealth should tolerate. It can be averted by recognizing that circumstances alter cases. Aviation needs and merits State assistance, both direct and indirect. Its abuse is a menace of the future; but its proper use and development provide protection against abuse, and are expected and required of all progressive peoples. State assistance should be adjusted so as to ensure adequate control of the expenditure of public money without crippling "bold enterprise in the pursuit of gain, and a keen scent for the trails that lead to it."

The trails in this case are air routes, which have now become as essential to imperial communications as sea routes, and the provision of which must, in the first instance, be carried out by the Governments concerned. That there is already a demand for air routes cannot be denied. A steadily increasing fraction of the population in all parts of the Empire, consisting of officials, business people, and those who prefer

flying as a means of travel, would use air routes where they existed, and help to pay for their upkeep in the same way as motorists are now paying for the roads. An Empire air mail service would be widely used and be an immediate source of revenue. To the many isolated communities dotted about the distant spaces of our Great Dominions, aviation could be made a precious boon, facilitating intercourse and education, relieving loneliness, bringing prompt succour to the suffering and sick.

Air routes involve no direct subsidy, but they do require co-operation between the Governments of the Great Dominions and the Home Government. This co-operation could take the form of grants of land, the equipping of landing-grounds with all requisite appliances, the erection of mooring-masts and sheds for airships, and the employment of military airmen on pioneer work. The whole Empire will benefit by air routes, and it is only just and reasonable that all its parts should contribute to their construction.

BRITISH AIRSHIP ROUTES

During the summer of 1927, two large British airships should be completed and make their trial flights. If these result satisfactorily, lighter than air vessels may be expected to play an important part in Empire communications.

Their value in defence may also prove to be considerable, and if they can serve as substitutes for light cruisers large savings on naval votes will be effected. But the two new ships will be tried out first as passenger carriers, and the strictest and most searching tests will be applied.

For various reasons, the trial course will be Eastward through Egypt to India, and thence, if all goes well, it may be extended to Australia and possibly New Zealand. This route should not, however, be regarded as a typical Empire airship route. Airship routes will have to be planned so as to meet the conditions of airship navigation as outlined in Chapter XIII, and it will probably be found that the western and southern extremities of Africa will form convenient junctions for several routes radiating to all parts of the world, linking Canada direct with Africa, and through Africa with Australia and New Zealand. There will be many advantages in this system, because rapid means of communication between the different parts of the Empire are as necessary as they are between each Dominion and the Mother Country. Centralization in a matter of this kind can easily be overdone. If British airships are the safest that science and thorough workmanship can produce; if British air routes are carefully laid out, with an eye to their commercial uses, and equipped with every known device for receiving, re-fuelling, repairing and helping aircraft on

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their way, they will attract and hold the air traffic of all nations, and put an all-red girdle of air transport more than half-way round the earth. The first outlay will undoubtedly be heavy, but however large the sum required, the advantages gained will be proportionate. New markets, wider and closer intercourse, fresh fields for enterprise and more knowledge are sure returns from such expenditure.

Nor are these all the benefits that will accrue. When Canada, Australia, New Zealand and South Africa are linked with the Mother Country and with one another by air routes, the network of communications thus created will not only confer air power, it will also consolidate the Empire, give a unity to widely-scattered peoples unattainable hitherto, create a new spirit or, maybe, revive an old spirit which was drooping, and inculcate a conception of the common destiny and mission of our race.

The late Lord Curzon once remarked that the British Empire could be made the greatest of all human instruments for good. That is our mission, and it should be sufficiently inspiring. But to do good power is needed, together with a national character that prohibits its abuse. We of the present generation have inherited sea power, and are now living in a transition period. A new power is emerging, whose magnitude and potentialities are only half understood. But if both Governments and peoples throughout

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the Commonwealth rise to the height of a great occasion, if British democracies display "the foresight, the keen sensitiveness to national position and credit" which made England great upon the sea, the Empire will gain a new lease of prosperity and need fear no rival in the air.

CHAPTER XV

THE LIMITATION OF AIR ARMAMENTS

IT may be claimed without undue optimism that another European war, in the immediate future, is most improbable. A pacifist with a taste for gambling, if there is such a person, might gamble on a period of ten years in which to convert would-be disturbers of the peace to his or her own way of thinking. On the other hand, reactionaries and militarists may utilize this period for very different purposes: some with an eye to further conquests, and others for preparing their revenge. Nevertheless, whatever the purposes to which it may be put, this breathing space is most welcome, and may be turned to good account if all the facts are faced.

On, so to speak, the credit side of the account, there is the fact that while many causes of dispute exist and that incidents arising from them are all too frequent, these incidents, which prior to 1914 would almost certainly have led to war, are now either being settled or deferred without resort to force. But on the debit side of the account, a candid observer, who does not

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confound desires with realities, is forced to recognize that this state of affairs is due less to a change of spirit throughout Europe than to post-war exhaustion, and that the attitude of the different States where trouble might occur, is passive rather than pacific, and may change when their warlike energies have been recuperated.

Again, while there has been much talk of a limitation of armaments, and while something in that direction was accomplished at the conference in Washington, it is none the less a fact that wherever possible, and that is to say in all the States which were victorious in the World War, elaborate and costly warlike preparations are being continued. Although Germany is disarmed, Austria helpless, Hungary hemmed in by a coalition, Bulgaria temporarily crushed, and Turkey in the throes of what may or may not be effective reorganization, all the late enemies of these defeated nations maintain large naval, military and air forces. Even Japan and the United States, in spite of the declared opinion of an eminent British sailor that a naval war between them is impracticable because they are too far apart, are spending huge sums on armaments.

In all the preparations now being made history repeats itself: old weapons are not being discarded, although new ones have been introduced. It has always been so: as a rule, much blood

and treasure have to be poured out before those responsible for the use and manufacture of any category of lethal weapons realize that its day has passed. So in our time, battleships are being built and masses of cavalry are maintained, while military aircraft are being perfected and air forces increase and multiply.

There is, however, a feature in the actual situation which differentiates it from analogous situations in the past, and which is only the more dangerous because it is often overlooked. Hitherto, the development of armaments has followed familiar lines. It is a far cry, admittedly, from the longbow to the magazine rifle, or from the carronade to the cannon carried by a modern battleship ; but great as the differences are between these weapons, the successive processes of substitution were effected without a fundamental transformation in the tactical and strategical methods required for their use. It is not so with aviation, of which it is a commonplace to say that it has transformed the art and character of war. Moreover, most military students will admit, in many cases with reluctance, that air action by itself may prove decisive. Hence, during the breathing space, it will be well worth while to consider the various aspects of air power, more especially because there will always be a tendency, on the part of certain nations and their experts,

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to accept readily big reductions in old forms of armament, and thereby to distract attention from the really vital issue—air policy, which provides the acid test of sincerity in these matters. With the advent of air forces even more completely adequate than they are at present for enforcing national policy, this tendency will become more masked.

While it is easy to lay down the general principle that the limitation of air armaments is both desirable and necessary, it is quite another matter to put this precept into practice. In two preceding chapters the effort has been made to distinguish between the foundation and the manifestation of air power. If the facts and arguments there presented are found valid, it will be evident that the difficulties of applying any really effective limitation of the new arm are exceptional, and not to be overcome by ordinary means.

One attempt has been made already, under conditions which at first sight seemed to ensure success. Its history is worth recording, since no better illustration could be given of this complicated question.

Shortly after the signature of peace with Germany, a set of rules was drawn up dealing with German aviation; they are usually referred to, after their number, as "The Nine Rules." These rules were framed to give effect to Article 198 of the Treaty of Versailles, whose

intention was to deprive Germany of all air power in any shape or form. In 1919, ideas on the subject of air power were still somewhat crude. The Treaty laid down merely that Germany was not to possess "any military or naval air forces." But by 1921, the question had been more deeply studied, and, on the advice of experts, the Supreme Council decided that, in order to carry out the intention of Article 198, it would be necessary to impose restrictions on the number and performance of all types of aircraft in Germany, as otherwise the Germans would be able, under the guise of developing civil aviation, to provide themselves with a powerful and secret air force.

A copy of "The Nine Rules" is reproduced at the end of this chapter; from it the reader can obtain a conception of the drastic nature of these restrictions. Not only were single-seaters (with engines of more than 60 h.p.), armoured and pilotless machines, and airplanes whose engines could be fitted with super-charging devices ruled out, and rightly so, as military; but Germany was also prohibited from possessing aircraft capable of attaining more than a limited speed, endurance and climbing power, or of carrying a "useful" load exceeding 1,320 lb. including the pilot, mechanic and various instruments. Similar restrictions were imposed on airship construction.

If what was sauce for the goose were sauce

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for the gander, that is to say, if these limitations were accepted generally, by victors and vanquished alike, there would be no air menace, indeed there would be very little aviation of any kind. Commercial aviation would be crippled. For example, the rule in regard to "useful" load prevented Germany from constructing a passenger machine which could be made a paying proposition. Luxury machines and mail carriers can be built to satisfy these conditions, but passenger services, for the benefit of ordinary members of the public, cannot be operated under them without a large State subvention.

It is a curious and significant fact that in spite of these restrictions, or perhaps because of them, for such is human nature, even while "The Nine Rules" were in force the Germans more than held their own in civil and commercial aviation. In addition to their futility, however, two other objections to such arbitrary measures at once suggest themselves. In the first place, it is anti-progressive and anti-social to discourage civil aviation anywhere. This means of locomotion can do a great deal for humanity if it is handled properly, and the contributions of all industrial peoples are needed for its full development. In the second place, discrimination against a conquered State, which in normal circumstances would be a formidable competitor in the aircraft industry, defeats what should be

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the chief purpose of such restrictions—the prevention of secret arming.

There are in all countries restless, suspicious beings, who, in the names of patriotism and nationalism, either cherish dreams of conquest or nurse revenge, and to whom warlike preparations are an obsession. No doubt Germany had and has her quota of such people, but she has also a large number of well-disposed commercial men whose sole and genuine desire it is to develop commercial aviation. "The Nine Rules" only served to exasperate these latter, and made them believe that the object of the Allies was to suppress civil as well as military aviation, by means of restrictions which had been inspired by their commercial rivals in the victorious States. If the rules had remained in force much longer, many a decent German would have been driven into the arms of the Nationalists, and would have devoted his knowledge and experience of aircraft manufacture to illicit preparations. Fortunately, it is now possible to refer to "The Nine Rules" in the past tense, as those affecting civil aviation ceased to be operative in the summer of 1926. As a consequence, Germany is building up a flourishing aircraft industry, and is thus laying the foundations of air power. This may constitute a menace, but in the end, it will be a less serious menace than its alternative—the provocation of moderate German opinion, and the

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consequent reinforcement of those elements in the population who are planning another war.

With the co-operation of experts in the aircraft industry, the organization of a secret air force would be a relatively simple matter compared to the organization of equivalent military and naval forces. Concealment would be easier. The wings, engines and other parts of the airplanes could be manufactured in different centres, within or without the frontiers, and be assembled at short notice, just before they were required for use. In all the industrial States of Europe, there are thousands of pilots and mechanics to form a nucleus for the personnel. Large numbers are not needed, quality is worth more than quantity, a few thousand intelligent, devoted men, working under a central organization, could carry their preparations almost to completion with slight risk of detection. This new weapon lends itself to centralized control; the moment to strike with it can be fixed to a minute; the plan need not be known to more than a chosen few, and is therefore less likely to be spoiled by talkative executants. Above all, it is cheap. Five hundred airplanes can be built for the price of a modern battleship.

While it is practically impossible to limit air power by the repression of civil and commercial aviation, it should be possible to bring about some limitation of air forces. Unfortunately, so far no progress has been made in this direction,

or at any rate, no agreement on the lines of the Washington Conference, to restrict the number of military aircraft, has yet been reached. After Locarno, Great Britain set an example by slowing down the rate of expansion of the British Air Force, which same expansion had only been inaugurated in 1923, in view of the rapid growth of continental air forces. But to this gesture there has not been as yet a perceptible response. So the expansion will continue, however slowly, until the full programme has been carried out. It is a ruinous procedure, yet there seems to be no alternative.

The dilemma is tragic. A new race in armaments may have begun, mainly under the cloak of a new form of locomotion and its associated industry. It may be, however, that aviation itself will produce a solution of the problem; that, as in the case of education, its first effects are bad; that a little flying, like a little learning, is a dangerous thing, and that more of it is the remedy. When people fly as now they ride on bicycles or in motor-cars; when they acquire an air sense which will enable them to visualize the capacity for destruction possessed by air forces; when they realize the nature of the losses and that there are no gains, they may discover sufficient common sense, or enlightened self-interest, to prevent the waste and futility of attempting to settle international disputes by such barbarous methods.

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A universal change of spirit is not necessary. If 50 per cent. of the citizens of the highly-developed industrial States, which are described as the Great Powers, understood and faced the facts of modern warfare, not only air armaments but all armaments would be limited to police requirements.

THE NINE RULES

RULES FOR DIFFERENTIATING BETWEEN CIVIL AND MILITARY AIRCRAFT

All aircraft exceeding the dimensions enumerated below will be considered as military aircraft, and, consequently, war material:

(A) MACHINES HEAVIER THAN AIR

Rule No. I.

Every single-seater aircraft of more than 60 h.p. will be considered as military aircraft and, consequently, war material.

Rule No. II.

Every aircraft capable of flying without a pilot will be considered as military aircraft and, consequently, war material.

Rule No. III.

Every aircraft being armoured, having any form of protection or any fittings for any form

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of armament, gun, torpedo or bomb will be considered as military aircraft and, consequently, war material.)

Rule No. IV.

Maximum ceiling at full throttle is 4,000 metres. (An engine fitted with any supercharging device will be considered as military aircraft and, consequently, war material.)

Rule No. V.

Speed with full throttle at an altitude of 2,000 metres 170 kilometres an hour. (Engines at full throttle and consequently giving full power.)

Rule No. VI.

The maximum quantity of oil and petrol (best quality aviation spirit) not to exceed $\frac{800 \times 170}{V}$ grammes per horse-power, V being the speed of the machine at full throttle and full power at a height of 2,000 metres.

Rule No. VII.

Every aircraft with a useful load of more than 600 kgs. including pilot, mechanic and instruments—even though fulfilling the conditions laid down in Rules IV, V and VI—will be considered as military aircraft and, consequently, war material.

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(B) AIRSHIPS

Airships with a cubic capacity exceeding the dimension specified below will be considered as military aircraft and, consequently, war material :

- | | | |
|------------------------|--------|---------------|
| 1. Rigid airships . . | 30,000 | cubic metres. |
| 2. Semi-rigid airships | 23,000 | „ |
| 3. Non-rigid airships | 20,000 | „ |

Rule No. VIII.

Factories constructing aeronautical material must be registered. Registration of aircraft, pilots and pupils must be in conformity with the conditions prescribed in the Air Convention of the 13th October, 1919. These lists will be at the disposal of the Committee of Guarantee.

Rule No. IX.

The number of aero engines and spare parts therefor must not exceed that considered necessary to the needs of civil aviation. The Committee of Guarantee will be the judge of the amount which is necessary.

GENERAL REMARKS

It is felt that the above-mentioned definitions should be revised every two years in order to consider any modification which the progress of aviation may have rendered necessary.

CHAPTER XVI

THE SOCIAL, ECONOMIC AND POLITICAL EFFECTS OF AVIATION

OUR ancestors were more alarmed about the social effects of flying than the present generation. Addison foretold that couples would make assignations on the top of the Monument, and cover the dome of St. Paul's until it looked like the outside of a pigeon-house. So far these prophecies have not been fulfilled, and more's the pity ; for although it is desirable that these particular buildings should be spared, it certainly would be a triumph for design and flying skill, if airplanes could alight on such circumscribed trysting spots. One of the chief defects of the airplane is, that though a more sedate conveyance than the Ford, and less dangerous than the side-car, it still requires a large space on which to land.

The chief social effect of any new form of locomotion is to make people more restless. This process begins with the very wealthy, who seldom stay long in the same place ; but gradually it permeates other classes, until large sections of the population acquire roving habits.

This is especially true of America, where the extensive use of motor-cars is having a perceptible effect on home life; literally millions of families spend their week-ends, at any rate in summer, on wheels and away from home. The spread of aviation may accelerate this tendency, but not to any marked extent for many years to come. It will at the same time decrease the congestion in great cities, spread out the dormitory suburbs, bring town and country into closer touch, stimulate intercourse between nations, reveal new opportunities for co-operation, facilitate business and quicken enterprise. These benefits should amply compensate for any additional restlessness caused by the air habit. Vices have been defined as the habits of other people; when we have all acquired the habit of the air, we may become more tolerant.

This happy consummation will not be reached, at any rate in Great Britain, until aviation is a popular sport, and air races attract large multitudes. The Germans, in order to popularize aviation, have races between airplanes, motor-cars and men on horseback, bicycles and their feet. All the entrants start together in front of the grand stand; they then go round different circuits, whose lengths have been calculated carefully and which reunite for the last lap. If the handicapping has been good, the most exciting finishes take place: an airplane,

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which was a speck on the horizon when the man running reached the straight, may catch him and beat him by a yard at the winning-post.

There are infinite possibilities in this idea, which, by appealing to national characteristics, will contribute to national prosperity and security.

New means of transport replace old ones in accordance with economic laws. They have to be cheaper to prevail, cheaper in time as well as money. Where passenger services are concerned, the transition period is short. Hansom cabs were driven quickly from the streets by taxi-cabs; the horse-drawn bus is a rare spectacle; coaches have practically disappeared. On the other hand, for short stages draught horses are still employed, as it is found they still can do this sort of work more economically than automobile vehicles. These latter are competing with the railways in the transportation of passengers and light goods, but not as yet of heavy freight.

In the same way, aviation will not begin to affect seriously either the motor industry or the railways, until air transport is as cheap in money as it is in time. For post-office work its advantages are obvious; these cannot be better illustrated than by the air mail in the United States, which functions by night as well as day. A letter posted in New York in the evening is delivered in Chicago the next morning,

twenty-four hours earlier than it would be by the ordinary post. For lengthy correspondence, the air mail is cheaper than night cables, and has many advantages over the telephone in business transactions. This service extends to the Pacific Coast, and although it does not yet pay its way, it should do so soon. A well-known American business man informed the writer, less than a year ago, that even then it was a perfectly feasible commercial proposition to run a combined passenger, mail and parcel service from New York through Chicago as far west as Omaha, and much progress has been made in the intervening period. The North American continent is the ideal theatre for bold enterprise in the use of airplanes as passenger and mail carriers. It will be a matter for surprise if the next few years do not produce startling developments in these directions.

The British will, of course, work eastward. Once a regular airplane service to India has been established, the number of passengers by it, to begin with anyhow, may be insignificant, but its value for mail purposes will soon be proved. Letters to Northern India could be delivered by this service in eight days from London, as compared with at least three weeks by present methods. Many communications which are now telegraphed would be sent by air mail. The bulk and weight of mail bags are, no doubt, considerable, but, for official and business corre-

spondence, both can be reduced by the aid of photography. Already, an ingenious device for effecting this has been patented.

When airships have been fully developed, they will compete with ocean liners for passengers and mails. In the end they will probably secure the great bulk of the latter and a fairly high proportion of the former. It has been estimated that a ticket to India by airship will cost about £10 less than one by rail and sea at present rates. The saving in time will of course be enormous—from eight to ten days on this particular route. If to this is added a saving in expense, all but the aged, the very young, the sickly and the nervous will take advantage of the air route.

It is often said that the risk of fire in airships, whose gas-bags are inflated with hydrogen, is so great that the employment of these vessels as passenger carriers must wait until some non-inflammable gas is readily and cheaply available. To defer airship development on this account would be unreasonable; in the first place because the use of heavy oil engines and insistence on the most ordinary precautions will reduce the risks of fire to a minimum; and in the second place, because no suitable gas is yet in sight. There is, of course, helium, of which the largest sources are in the United States; but this gas has many disadvantages as compared with hydrogen. It is at once heavier, which means that more of it is required for the

same lift, and more costly, since it is a natural gas which cannot be manufactured and is found in small quantities in distant places. A well-known American airship expert told the writer that, in his opinion, the only use for helium was in military airships, and even that he doubted; because, for the reasons given above, it would restrict unduly their mobility and freedom of manœuvre. He was himself a convinced hydrogen man.

Regular airship services should be established across the North and South Atlantic during the next ten years. With these, once the safety and convenience of airships have been demonstrated, the great shipping companies will be forced to combine, and a new, and eventually world-wide, industry will come into existence, whose economic effects will be as far-reaching and beneficial as those which followed the application of steam power to sea-craft.

To predict the effect of aviation on international relations is a delicate and difficult undertaking. So far, improved methods of transportation have been applied to warlike purposes, they have not served, to any perceptible extent, to diminish Nationalism, allay suspicion, or increase goodwill. With the appearance of each new invention, the first pre-occupation of Governments has been its use in war. The World-War did more to encourage and develop transport than any corresponding

period in the history of mankind ; the amazing development of aviation is not the least noteworthy of its by-products.

At first sight, therefore, it would seem that aviation will tend to extend the area of conflict, discover new bones of contention and, in the event of another war, to intensify the destruction of both property and life. This will be so if air power is abused, and whether it is abused or not will depend on the direction given to its development during the next few years by the industrial States of Europe and the United States of America.

In twenty years' time, if the present rate of development is maintained, air power, compared to what it is to-day, will be as much more formidable as the British Air Force, in 1926, is than the dual organization of naval and military air services which existed in 1914. This comparison would be inaccurate and misleading if it were based solely on the numbers of men, units and machines on the active list or in reserve. If such an expansion of air forces were likely to take place, the prospect would be black indeed, more especially for the taxpayers. But, as has been emphasized already, there are other and more important factors. The size and character of the national aircraft industry, the attitude of the people towards aviation, and the use made of it, are the standards of measurement for air power. Progressive nations will

acquire this power by and for its proper uses, but others may be tempted to abuse it. The unscrupulous will only be restrained if they know there are reserves of power opposed to them. These reserves will exist if civilized peoples develop aviation for the benefit and progress of mankind, and not as an addition to the armoury of destruction.

There are many factors favourable to the attainment of this ideal. Although the embers of the last conflagration are still smouldering, for the present the chances of aggression, on a serious scale, may be regarded as remote. Air power is vested in industrial States enjoying more or less democratic forms of government, whose peoples will not lightly enter on another war. The British people, for example, have much to gain, quite apart from considerations of defence, by the establishment of air services linking the Mother Country with the Dominions, and much to lose by their disturbance. The French Government, for many and various reasons, encourages commercial aviation; France maintains a gigantic air force, but at the same time, with characteristic perspicuity, the French are building up a system of air communications, which may for the moment not be profitable, but whose derangement would involve enormous loss. The German people have given proof that they need no incentive in regard to aviation; their enthusiasm for it is

noteworthy, and may become portentous if their example is not followed. Germany's geographical position makes her a focus for several trans-continental air routes; these will bring revenue and prosperity to the German people while they serve no other purpose. There is no more promising field for civil and commercial aviation than the continent of North America. At the same time, no people have less temptation to abuse air power than the citizens of the United States. The more progressive nations are, the more they will take advantage of the peace uses of aviation. In this field, with the opportunities her vast territories confer, America may give the world a lead. And it is certain that if the English-speaking peoples throughout the British Empire and in North America would work together, they could put a girdle of air communications round the globe which would at once increase security and quicken progress.

It may be argued that these same factors operated when previous innovations in means of transport were first introduced. No doubt they did, and no doubt their tendency was similar, but they were comparatively weak, and the world was less enlightened in those days. There had been no World War, news travelled slowly, and the mass of people lived in ignorance of what was happening until long after the event. Moreover, the changes effected, for example, by rail and motor transport, were changes in degree

but not in kind, as compared with older methods. Whereas aviation, with motion in a third dimension, has gone far, and will go farther still, to obliterate frontiers on land and sea. Its uses, both in war and peace, are capital and not subsidiary : it provides at once the most terrible of all weapons of destruction, and the swiftest of all means of locomotion ; it has created a new and independent fighting service, and a new industry which bids fair to become as world wide and important as shipbuilding.

Aviation is not comparable with any other human activity ; it cannot yet be classified nor can its full political reactions be foreseen. It is a source of rivalry between nations, yet it unites them ; there is a freemasonry between airfarers, which is an expression of a new international spirit evolved in the common struggle against Nature's forces for the conquest of the air. The future is with the airfaring nations, as the past has been with seafaring nations ; and this may bring about political re-groupings in both hemispheres. If this re-grouping should establish a new " Balance of Power," a sinister impulse will be given to aviation and the race in armaments, whose inevitable climax will be war. Fortunately, international statesmanship has devised a means of checking tendencies in this direction—the League of Nations. With one conspicuous exception, all the big industrial states, which alone can possess air power, are

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permanently represented on the League Council. Cynics may scoff at the Council for its failure to take prompt action where Great Powers are concerned; but they forget that the League has other and no less useful functions.

A new "Balance of Power" would require years of planning and intrigue; and it may confidently be expected that there will always be in the Assembly at Geneva irrepressible and vigilant observers, who will not be stifled in committees, who will shed the fierce light of publicity on armaments, and will speak for the inarticulate majority in all lands to whom war is an unmitigated curse.

CHAPTER XVII

CONCLUSION

THE last twenty years have been prolific of mechanical inventions, most of which add to the amenities of life, and some of which will leave a permanent mark on civilization. This rapid progress in mechanics has not been accompanied by a corresponding development of mental, moral and, for lack of a more exact term, spiritual qualities. Although it would be unfair to compare the benefits conferred by science on this generation to pearls cast before swine—many a good motor-car is wasted on a roadhog—it is true that we do not grasp the full significance and scope of at least some of the marvellous achievements amid which we live.

This is especially true of aviation, which, thanks to the impulse given to it by the World War, has been developed so rapidly, that it is now about twenty years ahead of the average human intelligence. There are still people who deny its practical utility; millions are afraid to fly, who face unflinchingly the perils of congested streets and main roads used as race

tracks by unskilful motorists ; there are even a few thousand fundamentalists who regard it as wicked. But apathy, however widespread, will not arrest the development of this disturbing world force by the enterprising few. Aviation will not stand still. It will confer enormous power on those who cultivate it ; States which neglect it will pay the penalty for their lack of energy and vision in loss of markets and defencelessness from air attack.

An eminent pacifist has declared recently : " There is no such thing as permanent peace ; peace has to be made afresh every day." This remark admits, by implication, the existence of forces hostile to peace ; and to deal with these forces some form of power is needed, the only justification for whose use would be to uphold law against aggression.

Air power is admirably fitted to provide the force behind international law and justice. It can be highly centralized and is easily controlled ; its action is not liable to be precipitated by an incident on a frontier, and can be restrained until the fifty-ninth minute of the twelfth hour. In such conditions, the last word should be with statesmen, whose decisions would not be embarrassed by chance encounters between armed forces on land or sea. Further, if and when action had become inevitable, it could be arrested at a moment's notice and, literally, suspended in mid-air.

These claims for air power will be valid only if it is vested in civilized States pledged to prevent war, so far as prevention is humanly possible. No highly-developed industrial nation will go to war willingly, since it has everything to lose by doing so, and nothing to gain. But all nations are not highly developed, nor indeed civilized, and if, from apathy or any other cause, those that claim to be both neglect aviation, the power which should be theirs will pass to others not bound by the same scruples, who will use it not to prevent war, but for purposes of conquest or revenge.

Nations will be tested in the future by their attitude towards aviation, and the peoples themselves even more than their Governments. The latter can only make provision for an air force and subsidize civil and commercial aviation. The former can be assisted in their education, but, mainly, they will have to acquire air sense by their own efforts. Air sense will be the hall-mark of efficient and progressive races; this sense means strength in its most modern form, strength in affairs and in defence. Such strength has always been, and always will be, required by the civilized to resist barbarians and to fortify progress against reaction.

APPENDIX

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APPENDIX

GENERAL REPORT OF THE COMMISSION OF JURISTS TO CONSIDER AND REPORT UPON THE REVISION OF THE RULES OF WARFARE

THE Conference on the Limitation of Armament at Washington adopted at its sixth Plenary Session, February 4, 1922, a resolution for the appointment of a Commission representing the United States of America, the British Empire, France, Italy and Japan to consider the following questions :—

- (a) *Do existing rules of international law adequately cover new methods of attack or defence resulting from the introduction or development, since The Hague Conference of 1907, of new agencies of warfare?*
- (b) *If not so, what changes in the existing rules ought to be adopted in consequence thereof as a part of the law of nations?*

The Commission was to report its conclusions to each of the Powers represented in its membership,

The Resolution also provided that those Powers should thereupon confer as to the acceptance of the report and the course to be followed to secure the consideration of its recommendations by the other civilized Powers. . . .

An invitation to participate in the work of the Commission was extended to and accepted by the Netherlands Government. It was also agreed that the programme of the Commission should be limited to the preparation of

rules relating to aerial warfare, and to rules relating to the use of radio in time of war.

The Commission has prepared a set of rules for the control of radio in time of war, which are contained in Part I of this Report, and a set of rules for aerial warfare, which are contained in Part II of this Report.

The Commission desires to add that it believes that if these sets of rules are approved and brought into force, it will be found expedient to make provision for their re-examination after a relatively brief term of years, to see whether any revision is necessary.

PART I

Deals with rules for the Control of Radio in time of war.

PART II

Rules of Aerial Warfare

CHAPTER I

APPLICABILITY : CLASSIFICATION AND REMARKS

Article 1

The rules of aerial warfare apply to all aircraft, whether lighter or heavier than air, irrespective of whether they are, or are not, capable of floating on the water.

For States which are parties to the Air Navigation Convention of 1919, aircraft are divided by article 30 into two classes, State aircraft and private aircraft, State aircraft being subdivided into military aircraft and aircraft exclusively employed in State service, such as posts, cus-

toms or police. The article also provides, however, that State aircraft, other than military, customs and police aircraft, are to be treated as private aircraft, and subject as such to all the provisions of that Convention. For practical purposes, therefore, States which are parties to the Convention of 1919 divide aircraft in time of peace into three categories :—

- (a) Military aircraft.
- (b) State aircraft employed for customs and police purposes.
- (c) Private aircraft and such State aircraft as are employed for purposes other than those enumerated in (b).

The Convention of 1919 has not yet become by any means universal, but it would be so inconvenient for States, which are parties to it, to come under different rules in time of war, that account has been taken of the provisions of the Convention when framing the articles adopted by the Commission.

It has also been necessary to take into account the fact that Italy has entrusted the supervision of the customs service to the military forces, a fact which has prevented the adoption of exactly the same language as that employed in article 30 of the Convention of 1919. When read in conjunction, however, with article 5 below, it will be found that the classification adopted by the code of rules of aerial warfare corresponds very nearly with that prescribed in article 30 of the Convention mentioned above.

Article 2

The following shall be deemed to be public aircraft :—

- (a) *Military aircraft.*
 - (b) *Non-military aircraft exclusively employed in the public service.*
- All other aircraft shall be deemed to be private aircraft.*

A clear distinction must be made between aircraft which form part of the combatant forces in time of war and those which do not. Each class must be easily recognizable ; this is essential if the immunities to which non-combatant aircraft are entitled are to be respected. Article 3 has been framed with this object.

Article 3

A military aircraft shall bear an external mark indicating its nationality and military character.

Public non-military aircraft are not in command of persons commissioned or enlisted in the fighting forces ; consequently there must be evidence on board the aircraft of the service in which they are engaged. Such evidence is afforded by their papers. It will be seen by reference to article 51 below that aircraft of this class may be visited for the purpose of the verification of their papers.

Article 4

A public non-military aircraft employed for customs or police purposes shall carry papers evidencing the fact that it is exclusively employed in the public service. Such an aircraft shall bear an external mark indicating its nationality and its public non-military character.

Article 5 has been adopted for the purpose of regulating the position of State-owned aircraft employed in the postal service, or for commercial purposes. Such aircraft will be engaged in international traffic which should properly subject them to the same measures of control as those to which private aircraft are subject. They should also bear the same marks.

In terms the article applies to all public non-military aircraft other than those employed for customs or police purposes, following in this respect the language adopted

in the last paragraph of article 30 of the Air Navigation Convention of 1919. It is in connection with aircraft employed in the postal service or for commercial purposes that it will find its chief application.

Objection has been expressed to this article by the Netherlands Delegation on the ground that its effect will be to subject State-owned aircraft to capture and to the jurisdiction of belligerent prize courts.

Article 5

Public non-military aircraft other than those employed for customs or police purposes shall in time of war bear the same external marks, and for the purposes of these rules shall be treated on the same footing, as private aircraft.

Private aircraft must in time of war bear marks to indicate their nationality and character and to enable the aircraft to be identified. It would be inconvenient that the marks to be borne in war time should differ from those borne in time of peace. For peace time the marks which a private aircraft is to bear are prescribed in the Air Navigation Convention of 1919. This Convention, however, is not universal in character and account must be taken of the position of States which are not parties to it. Nevertheless, all States, whether parties to the Convention or not, will before long have enacted legislation as to the marks which aircraft of that nationality are to bear. The Commission has therefore felt that it will be sufficient to lay down as the rule for time of war that aircraft must bear the marks which are prescribed by the legislation in force in their own country. Foreign Powers, whether belligerent or neutral, are not concerned with the enforcement of that legislation as such; that is a matter for the municipal courts of the country concerned. The object of the article is to afford to belligerent and neutral authorities a guide as to the marks which a private aircraft must bear.

Article 6

Aircraft not comprised in articles 3 and 4 and deemed to be private aircraft shall carry such papers and bear such external marks as are required by the rules in force in their own country. These marks must indicate their nationality and character.

Great abuses might prevail if the external marks affixed to an aircraft could be altered while the machine was in flight. It is also necessary that the marks should be clearly visible. The principles adopted in article 7 are in harmony with the provisions of the Air Navigation Convention of 1919.

Article 7

The external marks required by the above articles shall be so affixed that they cannot be altered in flight. They shall be as large as is practicable and shall be visible from above, from below, and from each side.

Each State chooses for itself the marks which its aircraft are to bear. The marks chosen for private aircraft in time of peace by States which are parties to the Air Navigation Convention of 1919 are set out in that Convention, and are generally known. It is equally important that the marks for public aircraft, whether military or non-military, should be equally well known, and also the marks chosen for private aircraft possessing the nationality of a State which is not a party to the said Convention. Notification to all other Powers is, therefore, provided for of the marks prescribed by the rules in force in each State.

Necessity may arise for a change in the marks adopted by each State. When that happens the change must be notified. If the change is made in time of peace, there can be no difficulty in notifying it before it is brought into force.

In time of war changes must be notified as soon as possible

and at latest when they are communicated by the State concerned to its own fighting forces. It will be important to a State, which changes the marks on its military aircraft in time of war, to notify the change as quickly as possible to its own forces, as otherwise the aircraft might run the risk of being shot down by their own side. For this reason no anxiety need be felt that there will be any attempt to evade compliance with the rule.

Regret has been expressed in some quarters that any change should be allowed in time of war of the marks adopted by a particular State. The practical reasons, however, in favour of allowing such modifications are overwhelming. The marks adopted by different countries for their military machines are in some cases not very dissimilar, and if war broke out between two countries whose military machines bore marks which were not readily distinguishable, it would be essential that a modification should be made.

Article 8

The external marks, prescribed by the rules in force in each State, shall be notified promptly to all other Powers.

Modifications adopted in time of peace of the rules prescribing external marks shall be notified to all other Powers before they are brought into force.

Modifications of such rules adopted at the outbreak of war or during hostilities shall be notified by each Power as soon as possible to all other Powers and at latest when they are communicated to its own fighting forces.

Article 9 is founded upon a proposal first submitted by the Japanese Delegation; an American proposal to the same effect was submitted at a later stage. The subject of the article is one of some difficulty and one which has in times past been fruitful of discussions and disagreements in connection with warships, the Powers not having been

able to agree whether the act of sovereignty involved in the commissioning of a warship might properly be exercised on the high seas (see the preamble to Convention VII of 1907).

The proposal received the support of a majority of the delegations only, the French Delegation being unable to accept it.

Article 9

A belligerent non-military aircraft, whether public or private, may be converted into a military aircraft, provided that the conversion is effected within the jurisdiction of the belligerent State to which the aircraft belongs and not on the high seas.

The proposal submitted by the Japanese Delegation would also have prevented the conversion of military aircraft into private aircraft except within the jurisdiction of the belligerent State concerned. The majority of the members of the Commission were of opinion that an article on this subject was not required. It does not seem likely that such conversion would be effected upon the high seas except for the purpose of enabling an aircraft, not otherwise entitled to do so, to enter neutral territory. There would be many practical difficulties in the way of any such conversion: not only would identity marks have to be affixed which would depend on the registration in the home State, but a civilian crew would have to be obtained and various certificates would be required, all of which should be dated. If the marks and papers belonging to some other aircraft were used, the marks and papers would be false. A fraud would have been practised on the neutral State. Even if the proceedings were authorized by the belligerent State concerned, so that it would be valid under its own law, the marks would still be false marks so far as concerned the neutral State, and if it became aware of the fraud committed, it would be justified in disregarding the conversion.

Article 10 adopts for time of war a principle which has already been adopted for private aircraft in time of peace by article 8 of the Air Navigation Convention of 1919.

Article 10

No aircraft may possess more than one nationality.

CHAPTER II

GENERAL PRINCIPLES

Article 11 embodies the general principle that outside the jurisdiction of any State, *i.e.*, in the air space over the high seas, all aircraft have full freedom of passage. Provisions embodied in other articles which restrict the liberty of individual aircraft are to be regarded as exceptions to this general principle.

Article 11

Outside the jurisdiction of any State, belligerent or neutral, all aircraft shall have full freedom of passage through the air and of alighting.

In time of peace many States are subject to treaty obligations requiring them to allow aircraft of other States to circulate in the air space above their territory. In time of war a State must possess greater freedom of action. Article 12 therefore recognizes the liberty of each State to enact such rules on this subject as it may deem necessary.

Article 12

In time of war any State, whether belligerent or neutral, may forbid or regulate the entrance, movement or sojourn of aircraft within its jurisdiction.

Knowledge of the Existence of the War

Among the provisions contained in the original American draft was an article to the following effect :—

“The liability of an aircraft for violation of the laws of war is contingent upon her actual or constructive knowledge of the existence of the war.”

The discussions upon this article led the American Delegation to withdraw the proposal.

Knowledge of the existence of a state of war was frequently in the past an important element in deciding cases instituted in prize courts for the condemnation of a ship or goods. Sailing ships were often at sea in old days for months without touching at any port, and under such conditions it was easy for a vessel to be unaware of the outbreak of war. The question diminished in importance when steamships tended to replace sailing ships, and diminished still more in importance when wireless telegraphy was invented and fitted to sea-going ships.

With aircraft the case is different ; the velocity of their flight and the small supplies of fuel which they can carry will render it unusual for a flight to exceed twelve hours in length. Cases are therefore not likely to arise in which there can be any doubt of the actual knowledge of the existence of a state of war, or in which constructive knowledge has to be relied on. Furthermore, all aircraft of important size are likely to be fitted with a wireless installation.

The Declaration of London, framed in 1909, contained provisions on this subject (see articles 43 and 45), and it was then found necessary to deal with the matter in greater detail than is attempted in the above American proposal. Until experience shows that it is necessary to frame a rule on this subject for aircraft, it seems more prudent to leave the matter to rest on the basis of the general rules of international law.

So far as concerns neutral Powers, the Convention on the Opening of Hostilities (No. III of 1907) lays down that the existence of a state of war must be notified to neutral Powers, and that they are subject to no obligations arising therefrom until the receipt of such notification. They cannot, however, rely on the absence of any such notification, if it can be established that they were actually aware of the existence of the state of war. This provision seems adequate and satisfactory.

CHAPTER III

BELLIGERENTS

The use of privateers in naval warfare was abolished by the Declaration of Paris, 1856. Belligerent rights at sea can now only be exercised by units under the direct authority, immediate control and responsibility of the State. This same principle should apply to aerial warfare. Belligerent rights should therefore only be exercised by military aircraft.

Article 13

Military aircraft are alone entitled to exercise belligerent rights.

Operations of war involve the responsibility of the State. Units of the fighting forces must, therefore, be under the direct control of persons responsible to the State. For the same reason the crew must be exclusively military in order that they may be subject to military discipline.

Article 14

A military aircraft shall be under the command of a person duly commissioned or enlisted in the military service of the State; the crew must be exclusively military.

Combatant members of the armed land forces must, if they are not in uniform, wear at least a distinctive emblem. So long as the officers or crew of a military aircraft are on board the aircraft there is no risk of any doubt as to their combatant status, but if they are forced to land they may become separated from the machine. In that event it is necessary for their own protection that their combatant status should be easily recognized.

Article 15

Members of the crew of a military aircraft shall wear a fixed distinctive emblem of such character as to be recognizable at a distance in case they become separated from their aircraft.

The next article indicates the aircraft which may engage in hostilities, and forbids private aircraft from being armed when they are outside the jurisdiction of their own country.

The immunities which a belligerent is bound to respect in a non-combatant impose upon the non-combatant a corresponding obligation not to take part in hostilities. This principle applies equally to aerial warfare. If a distinction is to be drawn between military and other aircraft, the distinction must be observed on both sides, and non-military aircraft must not attempt to engage in hostilities in any form.

To give full effect to this principle, a non-military aircraft must be debarred from transmitting, during flight, military intelligence for the benefit of a belligerent. This rule will be seen to be natural and logical if the peculiar characteristics of aircraft are borne in mind. It is as scouts and observers that one of their principal uses is found in time of war. If non-military aircraft were to be allowed to act in this capacity, injury of very serious consequence might be done to the opposing belligerent. If exposed to such risk, no belligerent could agree to respect the immunities which a non-combatant aircraft should enjoy, and the

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only way to ensure such respect is to recognize that the transmission of military intelligence for the benefit of a belligerent is a participation in hostilities, which would constitute a violation of the laws of war and would be dealt with accordingly.

The rule as framed has been restricted within the narrowest limits compatible with military safety. It is limited to transmission of intelligence during flight. When the flight has been completed, the individual concerned will be within the jurisdiction of some State, and there the control of the transmission of information will be subject to the regulations of that State. It will not be affected by the provisions of this article.

The mounting of arms in time of war may be construed as *prima facie* evidence of an intention to take part in hostilities. It is true that of recent years certain States found it necessary to arm merchant ships in self-protection, but the conditions of air warfare are so different that it has not been thought necessary to allow for such a proceeding on the part of aircraft. A gun would not be an adequate protection to an aircraft against illegal attack, as the first warning the aircraft might have of any such attack would be an act which might involve its destruction.

On the other hand, to permit private aircraft to be armed would facilitate acts of perfidy on the part of an opposing belligerent; an aircraft masquerading under false marks might suddenly open fire, and the risk of this would be sufficient to render it dangerous for an honest belligerent to respect the immunities of private aircraft to the extent which he would wish.

The interests of private aircraft are from every point of view better served by the adoption of a rule against the arming of private aircraft in time of war.

The article as framed does not extend to aircraft within the jurisdiction of their own State. Such an extension would be an unreasonable interference with the domestic jurisdiction of the State concerned.

The rule against aircraft being armed is limited to private aircraft. Public non-military aircraft engaged in customs or police work may find it necessary to carry arms because the fulfilment of their functions renders it essential for them to be able to apply coercion in case of need. In their case, the carriage of arms would raise no presumption of an intention to take part in hostilities, but they are subject just as much as private aircraft to the provisions of the first two paragraphs of the article.

Article 16

No aircraft other than a belligerent military aircraft shall engage in hostilities in any form.

The term "hostilities" includes the transmission during flight of military intelligence for the immediate use of a belligerent.

No private aircraft, when outside the jurisdiction of its own country, shall be armed in time of war.

The provisions of the Geneva Convention have been applied to maritime warfare by the Convention signed at The Hague in 1907 (Convention X of 1907). It will probably be found desirable to extend them in due course to warfare in the air and to negotiate a special convention for this purpose. Pending the conclusion of any such convention, a rule has been adopted stating broadly that these conventions apply to aerial warfare. Flying ambulances should enjoy the privileges and immunities conferred by the Geneva Convention upon mobile medical units or sanitary formations. The work of such flying ambulances must, of course, be carried out subject to similar conditions of belligerent control as those laid down in the Conventions of 1906 and 1907, and they must devote themselves to the task of succouring all wounded impartially in accordance with the principles embodied in these Conventions. When the new special convention referred to above is concluded,

the opportunity will no doubt be taken to extend to flying ambulances the exemption from dues already conferred by treaty upon hospital ships which enter a foreign port.

Article 17

The principles laid down in the Geneva Convention, 1906 and the Convention for the adaptation of the said Convention to Maritime War (No. X of 1907) shall apply to aerial warfare and to flying ambulances, as well as to the control over flying ambulances exercised by a belligerent commanding officer.

In order to enjoy the protection and privileges allowed to mobile medical units by the Geneva Convention, 1906, flying ambulances must bear the distinctive emblem of the Red Cross in addition to the usual distinguishing marks.

CHAPTER IV

HOSTILITIES

Article 18 is intended to clear up a doubt which arose during the recent war. The use of tracer bullets against aircraft was a general practice in all the contending armies. In the absence of a hard surface on which the bullet will strike, an airman cannot tell whether or not his aim is correct. These bullets were used for the purpose of enabling the airman to correct his aim, as the trail of vapour which they leave behind indicates to him the exact line of fire. In one case, however, combatant airmen were arrested and put on trial on the ground that the use of these bullets constituted a breach of the existing rules of war laid down by treaty.

The use of incendiary bullets is also necessary as a means of attack against lighter-than-air craft, as it is by setting

fire to the gas contained in these aircraft that they can most easily be destroyed.

In the form in which the proposal was first brought forward its provisions were limited to a stipulation that the use of tracer bullets against aircraft generally was not prohibited.

Various criticisms were, however, made about the proposed text, chiefly founded on the impracticability for an airman while in flight to change the ammunition which he is using in the machine gun in his aircraft. He cannot employ different bullets in accordance with the target at which he is aiming, one sort of ammunition for other aircraft and another sort for land forces by whom he may be attacked.

The Commission, therefore, came to the conclusion that the most satisfactory solution of the problem would be to state specifically that the use of tracer, incendiary or explosive projectiles by or against aircraft is not prohibited.

Article 18

The use of tracer, incendiary or explosive projectiles by or against aircraft is not prohibited.

This provision applies equally to States which are parties to the Declaration of St. Petersburg, 1868, and to those which are not.

In order that there may be no doubt that the use of false external marks is not a legitimate ruse, it has been specifically prohibited. By later provisions in the rules, the use of false external marks is made a ground for capture and condemnation of a neutral aircraft.

What are here referred to are false marks of nationality or character, the marks which are dealt with in Chapter I of these rules. The article would not apply to mere squadron badges or other emblems which are only of interest to one particular belligerent force.

Article 19

The use of false external marks is forbidden.

Another mode of injuring the enemy, which it has seemed desirable to prohibit, is that of firing at airmen escaping from a disabled aircraft.

Article 20

When an aircraft has been disabled, the occupants, when endeavouring to escape by means of a parachute, must not be attacked in the course of their descent.

Incidents took place in the recent war which showed the desirability of having a distinct rule on the question whether the dropping of leaflets for propaganda purposes was a legitimate means of warfare. Attempts were made by one belligerent to impose heavy penalties on airmen who were forced to descend within his lines after engaging in this work.

Article 21 has been framed to meet this case. It is not limited to dropping leaflets, as aircraft can disseminate propaganda by other means, such for instance, as emitting trails of smoke in the form of words in the sky.

What is legalized by the article is the use of aircraft for distributing propaganda. It does not follow that propaganda of all kinds is thereby validated. Incitements to murder or assassination will, for instance, still be considered illegitimate forms of propaganda.

Article 21

The use of aircraft for the purpose of disseminating propaganda shall not be treated as an illegitimate means of warfare.

Members of the crews of such aircraft must not be deprived of their rights as prisoners of war on the charge that they have committed such an act.

Bombardment

The subject of bombardment by aircraft is one of the most difficult to deal with in framing any code of rules for aerial warfare.

The experiences of the recent war have left in the mind of the world at large a lively horror of the havoc which can be wrought by the indiscriminate launching of bombs and projectiles on the non-combatant populations of towns and cities. The conscience of mankind revolts against this form of making war in places outside the actual theatre of military operations, and the feeling is universal that limitations must be imposed.

On the other hand, it is equally clear that the aircraft is a potent engine of war, and no State which realizes the possibility that it may itself be attacked, and the use to which its adversary may put his air forces, can take the risk of fettering its own liberty of action to an extent which would restrict it from attacking its enemy where that adversary may legitimately be attacked with effect. It is useless, therefore, to enact prohibitions unless there is an equally clear understanding of what constitute legitimate objects of attack, and it is precisely in this respect that agreement was difficult to reach.

Before passing to a consideration of the articles which have been agreed, mention must be made of the Declaration prohibiting the Discharge of Projectiles and Explosives from Balloons, signed at The Hague in 1907. Three of the States represented on the Commission¹ are parties to that Declaration; the other three are not. Under the terms of this Declaration the Contracting Powers agree to prohibit the discharge of projectiles and explosives from balloons *or by other new methods of a similar nature*. Its terms are, therefore, wide enough to cover bombardment by aircraft. On the other hand, the scope of the Declaration is very limited; in duration it is to last only until the

¹ United States of America, Great Britain, and The Netherlands.

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close of the Third Peace Conference, a conference which was to have been summoned for 1914 or 1915, and its application is confined to a war between contracting States without the participation of a non-contracting State.

The existence of this Declaration can afford no solution of the problems arising out of the question of bombardment from the air, even for the States which are parties to it.

The number of parties is so small that, even if the Declaration were renewed, no confidence could ever be felt that when a war broke out it would apply. A general agreement, therefore, on the subject of bombardment from the air is much to be desired. For the States which are parties to it, however, the Declaration exists and it is well that the legal situation should be clearly understood.

As between the parties it will continue in force and will operate in the event of a war between them, unless by mutual agreement its terms are modified, or an understanding reached that it shall be regarded as replaced by some new conventional stipulation ; but it will in any case cease to operate at the moment when a Third Peace Conference concludes its labours, or if any State which is not a party to the Declaration intervenes in the war as a belligerent.

No difficulty was found in reaching an agreement that there are certain purposes for which aerial bombardment is inadmissible.

Article 22 has been formulated with this object.

Article 22

Aerial bombardment for the purpose of terrorizing the civilian population, of destroying or damaging private property not of military character, or of injuring non-combatants, is prohibited.

The Naval Bombardment Convention of 1907 (No. IX) allows bombardment for enforcing payment of requisitions for supplies necessary for the immediate use of the naval

forces (article 3), but not for enforcing payment of money contributions (article 4).

For aerial warfare it has been decided to adopt the more stringent rule of the Land Warfare Regulations.

Article 23

Aerial bombardment for the purpose of enforcing compliance with requisitions in kind or payment of contributions in money is prohibited.

Agreement on the following article specifying the objects which may legitimately be bombarded from the air was not reached without prolonged discussion. Numerous proposals were put forward by the various delegations before unanimity was ultimately attained. The text of these proposals will be found in the minutes. In particular, mention may be made of an Italian proposal of the 8th February, on which the text ultimately adopted was in great part founded. Regret was expressed by some delegations that a more far-reaching prohibition did not meet with unanimous acceptance.

The terms of the article are so clear that no explanation of the provisions is necessary, but it may be well to state that in the phrase in paragraph 2 "military establishments or depots" the word "depots" is intended to cover all collections of supplies for military use which have passed into the possession of the military authorities and are ready for delivery to the forces, "distinctively military supplies" in the succeeding phrase is intended to cover those which by their nature show that they are certainly manufactured for military purposes.

If the code of rules of aerial warfare should eventually be annexed to a convention, paragraph 5 of the article would find a more appropriate place in the convention.

It will be noticed that for aerial bombardment the test adopted in article 25 of the Land Warfare Regulations, that of the town, &c., being defended, is abandoned. The

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nature of the objective or the use to which it is being put now becomes the test.

Article 24

1. *Aerial bombardment is legitimate only when directed at a military objective, that is to say, an object of which the destruction or injury would constitute a distinct military advantage to the belligerent.*

2. *Such bombardment is legitimate only when directed exclusively at the following objectives: military forces; military works; military establishments or depots; factories constituting important and well-known centres engaged in the manufacture of arms, ammunition or distinctively military supplies; lines of communication or transportation used for military purposes.*

3. *The bombardment of cities, towns, villages, dwellings or buildings not in the immediate neighbourhood of the operations of land forces is prohibited. In cases where the objectives specified in paragraph 2 are so situated that they cannot be bombarded without the indiscriminate bombardment of the civilian population, the aircraft must abstain from bombardment.*

4. *In the immediate neighbourhood of the operations of land forces, the bombardment of cities, towns, villages, dwellings or buildings is legitimate provided that there exists a reasonable presumption that the military concentration is sufficiently important to justify such bombardment, having regard to the danger thus caused to the civilian population.*

5. *A belligerent State is liable to pay compensation for injuries to person or to property caused by the violation by any of its officers or forces of the provisions of this article.*

Both in land warfare and in maritime warfare the principle has been adopted that certain special classes of buildings must be spared so far as possible in case of bombardment; for the former, by article 27 of the Land Warfare Regulations, for the latter by article 5 of the Naval

Bombardment Convention of 1907 (No. IX). A similar provision, largely based on that in the Naval Bombardment Convention, has been adopted as article 25. By day, these privileged buildings must be marked in a way which will make them visible to aircraft; the marks agreed on being those laid down in the Geneva Convention and in the Naval Bombardment Convention; the use of such marks is made obligatory so as to correspond with the duty placed on the adversary of sparing such buildings. By night, however, the use of lights to make the special signs visible is optional, because experience has shown that such lights may serve as guides to night-flying aircraft and may thereby be of service to the enemy.

Article 25

In bombardment by aircraft, all necessary steps must be taken by the commander to spare as far as possible buildings dedicated to public worship, art, science, or charitable purposes, historic monuments, hospital ships, hospitals and other places where the sick and wounded are collected, provided such buildings, objects or places are not at the time used for military purposes. Such buildings, objects and places must by day be indicated by marks visible to aircraft. The use of marks to indicate other buildings, objects or places than those specified above is to be deemed an act of perfidy. The marks used as aforesaid shall be in the case of buildings protected under the Geneva Convention the red cross on a white ground, and in the case of other protected buildings a large rectangular panel divided diagonally into two pointed triangular portions, one black and the other white.

A belligerent who desires to secure by night the protection for the hospitals and other privileged buildings above mentioned must take the necessary measures to render the special signs referred to sufficiently visible.

A proposal was submitted by the Italian Delegation for the purpose of securing better protection from aerial

bombardment for important historic monuments. During the recent war it was not found that the articles in the Land Warfare Regulations and the Naval Bombardment Convention were sufficient to prevent historic monuments from being bombarded. An unscrupulous opponent can always allege that they are being used for military purposes and ignore the written agreements accordingly. There is also the possibility that in the attack on some object which is a legitimate subject for bombardment, an historic monument in the immediate vicinity may be injured.

The Italian proposal comprised two new features, the creation of a zone round each historic monument within which the State was to be debarred from committing any act which constituted a use of the area for military purposes, and a system of inspection under neutral auspices to ensure that the undertaking was carried out, both as regards the monument itself and the zone. By this means any pretext for the bombardment would be removed, and the risk of unintentional injury would be minimized.

The proposal received the sympathetic consideration of all the Delegations, and it was accordingly remitted to an expert committee for more detailed consideration. Article 26 has been prepared in the light of their report.

The Italian proposal comprised not only historic but also artistic monuments. It has seemed better to omit the word "artistic" for fear lest a divergence should appear to be created between the new article and article 25, the language of which is modelled on article 27 of the Land Warfare Regulations and article 5 of the Naval Bombardment Convention (No. IX of 1907). The words "historic monument" in this article are used in a broad sense. They cover all monuments which by reason of their great artistic value are historic to-day or will become historic in the future.

It should be clearly understood that adoption of the system is only permissive. If a State prefers to trust only to article 25 to secure protection of its monuments, there

is no obligation upon it to notify them to other Powers in peace time and to establish the surrounding zones which are not to be used for military purposes.

The notification must be made through the diplomatic channel. It will then be open to any State receiving the notification, if it thinks it necessary to do so, to question within a reasonable time the propriety of regarding a particular place as an historic monument. If no question is raised with regard to the monuments notified, other States will be regarded as having accepted the demand for the protection of such monuments from bombardment, and the immunity will then rest on the basis of agreement. For the same reason the notification once made must not be withdrawn after the outbreak of hostilities.

Considerable hesitation was expressed in accepting the provision that notification must be made in time of peace. It was urged that the system proposed was a new procedure, that particular monuments might be forgotten, and that more elasticity should be allowed. On the other hand, it was urged that the essence of the scheme was to get agreement as to the immunity of these monuments, and that unless notification in time of war was excluded, it was not likely that any would be notified in time of peace.

The effect of allowing a 500-metre zone to be drawn round each monument may well be that in certain special cases, as, for instance, Venice or Florence, which are particularly rich in ancient and historic monuments, a large portion of the city would be comprised within the protected zones. The zones round each monument will overlap and so create a continuous area. The subsequent provisions will, however, ensure that there is a complete absence of military use of any portion of the area so protected.

It was agreed that if the belligerents did not for military reasons place the signs indicated in the article, enemy aviators had no right by reason merely of their absence to bombard the zone in question, if it had been duly determined and notified.

In their report, the experts stated that they considered that the marks designed to indicate the zones of protection round monuments should differ in design from those prescribed by article 25 for the historic monuments themselves. The Commission took note of this recommendation.

The prohibition against the use of the zone surrounding the monument must be very strictly interpreted. There must be a complete cessation of the use of any place, including, for instance, factories and railway lines, with a military purpose in view.

The special committee of inspection provided for by the article will be constituted by the State which has taken advantage of the article. There would not seem to be any need to establish the committee until the outbreak of war. As these special arrangements will have to be made in order to secure full protection for its historic monuments, the State will be bound to afford to this committee the fullest opportunity for making the investigations they may think necessary.

Article 26

The following special rules are adopted for the purpose of enabling States to obtain more efficient protection for important historic monuments situated within their territory, provided that they are willing to refrain from the use of such monuments and a surrounding zone for military purposes, and to accept a special regime for their inspection :—

1. *A State shall be entitled, if it sees fit, to establish a zone of protection round such monuments situated in its territory. Such zones shall in time of war enjoy immunity from bombardment.*
2. *The monuments round which a zone is to be established shall be notified to other Powers in peace time through the diplomatic channel; the notification shall also indicate the limits of the zones. The notification may not be withdrawn in time of war.*

3. *The zone of protection may include, in addition to the area actually occupied by the monument or group of monuments, an outer zone, not exceeding 500 metres in width, measured from the circumference of the said area.*
4. *Marks clearly visible from aircraft either by day or by night will be employed for the purpose of ensuring the identification by belligerent airmen of the limits of the zones.*
5. *The marks on the monuments themselves will be those defined in article 25. The marks employed for indicating the surrounding zones will be fixed by each State adopting the provisions of this article, and will be notified to other Powers at the same time as the monuments and zones are notified.*
6. *Any abusive use of the marks indicating the zones referred to in paragraph 5 will be regarded as an act of perfidy.*
7. *A State adopting the provisions of this article must abstain from using the monument and the surrounding zone for military purposes, or for the benefit in any way whatever of its military organization, or from committing within such monument or zone any act with a military purpose in view.*
8. *An inspection committee consisting of three neutral representatives accredited to the State adopting the provisions of this article, or their delegates, shall be appointed for the purpose of ensuring that no violation is committed of the provisions of paragraph 7. One of the members of the committee of inspection shall be the representative (or his delegate) of the State to which has been entrusted the interests of the opposing belligerent.*

Espionage

The articles dealing with espionage follow closely the precedent of the Land Warfare Regulations.

Article 27 is a verbal adaptation of the first paragraph of article 29 of the Regulations, so phrased as to limit it to acts committed while in the air.

Consideration has been given to the question whether there was any need to add to the provision instances of actions which were not to be deemed acts of espionage, such as those which are given at the end of article 29 in the Regulations, and it was suggested that article 29¹ of the American draft might appropriately be introduced in this manner. It was decided that this was unnecessary. The article submitted by the American Delegation was intended to ensure that reconnaissance work openly done behind the enemy lines by aircraft should not be treated as spying. It is not thought likely that any belligerent would attempt to treat it as such.

Article 27

Any person on board a belligerent or neutral aircraft is to be deemed a spy only if acting clandestinely or on false pretences he obtains or seeks to obtain, while in the air, information within belligerent jurisdiction or in the zone of operations of a belligerent with the intention of communicating it to the hostile party.

Acts of espionage by members of the crew of an aircraft or by persons who have been carried in an aircraft may well be committed after they have left the aircraft. They will in that case be subject to the Land Warfare Regulations.

Article 28

Acts of espionage committed after leaving the aircraft by members of the crew of an aircraft or by passengers transported

¹ Acts of the personnel of correctly marked enemy aircraft, public or private, done or performed while in the air, are not to be deemed espionage.

by it are subject to the provisions of the Land Warfare Regulations.

Two rules have been adopted in land warfare with respect to espionage which should apply equally to aerial warfare. These are that a spy cannot be punished without previous trial, and that a member of an army who commits an act of espionage and succeeds in rejoining the army cannot, if he is subsequently captured, be made responsible for the previous act of espionage. He is entitled to be treated as a prisoner of war.

Article 29

Punishment of the acts of espionage referred to in articles 27 and 28 is subject to articles 30 and 31 of the Land Warfare Regulations.

CHAPTER V

MILITARY AUTHORITY OVER ENEMY AND NEUTRAL AIRCRAFT AND PERSONS ON BOARD

The rapidity of its flight would enable an aircraft to embarrass the operations of land or sea forces, or even operations in the air, to an extent which might prove most inconvenient or even disastrous to a belligerent commander. To protect belligerents from improper intrusions of this kind, it is necessary to authorize belligerent commanders to warn off the intruders, and, if the warning is disregarded, to compel their retirement by opening fire.

It is easy to see that undue hardship might be occasioned to neutrals if advantage were taken of the faculty so conferred on belligerent commanding officers and attempts were made to exclude for long or indefinite periods all neutrals from stipulated areas or to prevent communication

between different countries through the air over the high seas. The present provision only authorizes a commanding officer to warn off aircraft during the duration of the operations in which he is engaged at the time. The right of neutral aircraft to circulate in the air space over the high seas is emphasized by the provisions of article 11, which provides that "outside the jurisdiction of any State, belligerent or neutral, all aircraft shall have full freedom of passage through the air and of alighting."

Article 30 is confined in terms to neutral aircraft, because enemy aircraft are in any event exposed to the risk of capture, and in the vicinity of military operations are subjected to more drastic treatment than that provided by this article.

It will be noticed that the terms of the article are general in character and would comprise even neutral public or military aircraft. It goes without saying that the article is not intended to imply any encroachment on the rights of neutral States. It is assumed that no neutral public or military aircraft would depart so widely from the practice of States as to attempt to interfere with or intrude upon the operations of a belligerent State.

Article 30

In case a belligerent commanding officer considers that the presence of aircraft is likely to prejudice the success of the operations in which he is engaged at the moment, he may prohibit the passing of neutral aircraft in the immediate vicinity of his forces or may oblige them to follow a particular route. A neutral aircraft which does not conform to such directions, of which he has had notice issued by the belligerent commanding officer, may be fired upon.

The power to requisition aircraft in occupied enemy territory is recognized in article 53 of the Land Warfare Regulations. The text of article 53 is not specific as to whether it includes neutral property, and though in practice

it is regarded as doing so, it has been thought well to adopt a special rule in harmony with article 53. It is not unreasonable that neutral owners of property should receive payment for their property at once, as they are not concerned with the peace which will be ultimately concluded.

Article 31

In accordance with the principles of article 53 of the Land Warfare Regulations, neutral private aircraft found upon entry in the enemy's jurisdiction by a belligerent occupying force may be requisitioned, subject to the payment of full compensation.

Property of the enemy State, which may be used for operations of war, is always liable to confiscation if it falls into the hands of the opposing belligerent. It is natural, therefore, that public aircraft of the enemy should be so treated.

Article 17 will create an exception in favour of flying ambulances as they will be protected by article 6 of the Geneva Convention, but this exception will be subject to the principle laid down in article 7 of the same Convention that the protection accorded to mobile medical units ceases if they are made use of to commit acts harmful to the enemy.

Article 32

Enemy public aircraft, other than those treated on the same footing as private aircraft, shall be subject to confiscation without prize proceedings.

Non-military aircraft of belligerent nationality, whether public or private, should not in general be exposed to the risk of instant destruction, but should be given the opportunity to land. If they are flying in the jurisdiction of their own State and enemy military aircraft approach, they

should, for their own protection, make the nearest available landing. Failure to do so exposes them to the risk of being fired upon.

Article 33

Belligerent non-military aircraft, whether public or private, flying within the jurisdiction of their own State, are liable to be fired upon unless they make the nearest available landing on the approach of enemy military aircraft.

The preceding article has dealt with the case of belligerent non-military aircraft flying in the jurisdiction of their own State. Article 34 deals with the same category of aircraft in certain other circumstances. If such aircraft are in the immediate vicinity of the territory of the enemy State, or in the immediate vicinity of its military operations by land or sea, they run the risk of being fired upon. They are, of course, liable to capture by reason of their enemy status, but in an area where it is probable that military operations will be in progress, or in any place where they are actually in progress, non-combatant aircraft of belligerent nationality can only proceed at their own risk. By their mere presence they expose themselves to the risk of being fired upon.

Article 34

Belligerent non-military aircraft, whether public or private, are liable to be fired upon, if they fly (1) within the jurisdiction of the enemy, or (2) in the immediate vicinity thereof and outside the jurisdiction of their own State, or (3) in the immediate vicinity of the military operations of the enemy by land or sea.

The principle has already been recognized in article 30 that a belligerent commanding officer may warn off neutral aircraft from the immediate vicinity of his military operations. If they fail to comply with such a warning, they run the risk of being fired upon. Article 35 deals with

neutral aircraft which may be flying within the jurisdiction of a belligerent country at a moment when military aircraft of the opposing belligerent approach. If warned of the approach of such military aircraft, it is their duty to make a landing; otherwise they might hamper the movements of the combatants and expose themselves to the risk of being fired upon. They are not, however, exposed to the risk of capture and condemnation as are neutral aircraft failing to comply with directions issued by a belligerent commander under article 30.

Article 35

Neutral aircraft flying within the jurisdiction of a belligerent, and warned of the approach of military aircraft of the opposing belligerent, must make the nearest available landing. Failure to do so exposes them to the risk of being fired upon.

Article 36 regulates the position of members of the crew and of passengers of an enemy aircraft which falls into the hands of a belligerent.

If the aircraft is a military aircraft, the crew will consist of members of the military forces and will, of course, be made prisoners of war. Any passengers will share the same fate, because in time of war a belligerent State would not be using its military aircraft for carrying non-combatant individuals unless their journey was a matter of importance to the State. Combatant passengers would naturally be made prisoners of war.

In the case of public non-military aircraft, the same principle applies. It is true that the members of the crew may not be members of the military forces, but they constitute part of the State organization. As to passengers, they would not be carried on such aircraft, except for Government purposes. There is, however, one important exception. A State-owned passenger-carrying aircraft line is not by any means an unlikely development and, if

such should be instituted, there would be no reason to apply this principle to all the passengers on such aircraft. They should only be made prisoners of war if in the service of the enemy, or enemy nationals fit for military service.

As regards private aircraft, it must be remembered that the crew will consist of trained men, constituting a reserve upon which the belligerent can draw in case of need. If they are of enemy nationality, or in the service of the enemy, there is good reason to hold them as prisoners of war. If they are neutrals not in the service of the enemy, they are by their service on board an enemy aircraft releasing other men for military purposes. If they are to be given their release, the belligerent should be entitled to protect himself in the future against such indirect assistance by exacting an undertaking from each individual against his serving in an enemy aircraft during the remainder of the war. Such an undertaking corresponds to that provided for in the second paragraph of article 5 of the Convention concerning restrictions on the right of capture in maritime war (No. XI of 1907). It was adopted there only for the officers of a merchant vessel, because the officers are the highly trained men. In the case of aircraft, it is reasonable to extend it to all the members of the crew.

What is said in the report on article 37 dealing with the crew and passengers of *neutral* private aircraft as to temporary delay in effecting the release in certain cases and as to members of the crew or passengers who have rendered special services to the belligerent being made prisoners of war, applies also in the case of the crew and passengers of an enemy aircraft.

Article 36

When an enemy military aircraft falls into the hands of a belligerent, the members of the crew and the passengers, if any, may be made prisoners of war.

The same rule applies to the members of the crew and the passengers, if any, of an enemy public non-military aircraft,

except that in the case of public non-military aircraft devoted exclusively to the transport of passengers, the passengers will be entitled to be released unless they are in the service of the enemy, or are enemy nationals fit for military service.

If an enemy private aircraft falls into the hand of a belligerent, members of the crew who are enemy nationals or who are neutral nationals in the service of the enemy, may be made prisoners of war. Neutral members of the crew, who are not in the service of the enemy, are entitled to be released if they sign a written undertaking not to serve in any enemy aircraft while hostilities last. Passengers are entitled to be released unless they are in the service of the enemy or are enemy nationals fit for military service, in which cases they may be made prisoners of war.

Release may in any case be delayed if the military interests of the belligerent so require.

The belligerent may hold as prisoners of war any member of the crew or any passenger whose service in a flight at the close of which he has been captured has been of special and active assistance to the enemy.

The names of individuals released after giving a written undertaking in accordance with the third paragraph of this article will be notified to the opposing belligerent, who must not knowingly employ them in violation of their undertaking.

When circumstances have arisen which have led to the detention of a neutral private aircraft by a belligerent, the question will arise of the treatment to be meted out to the crew and to the passengers, if any, of such aircraft. In general, the crew of an aircraft will be very expert individuals, whose services would be of great value to a belligerent. If they are of enemy nationality or in the service of the enemy, or engaged in a violation of neutrality, there is good reason for detaining them as prisoners of war. If not, they should be released unconditionally.

Passengers who are in the service of the enemy or who

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are enemy nationals fit for military service may likewise be detained.

Immediate release of persons who cannot be made prisoners of war may not in all cases be feasible. The fact that military exigencies may necessitate a temporary delay in according release does not prejudice the right to such release in due course.

The peculiar characteristics of aircraft may enable members of the crew or passengers in a neutral aircraft in time of war to render services of special importance to a belligerent. Where such services have been rendered in the course of the flight in which such persons were captured, the individuals may be made prisoners of war, whatever their nationality.

The rules adopted on this subject are in conformity with the practice of the recent war, but they have not secured unanimous assent. The Netherlands Delegation has felt unable to accept them for two reasons, viz., firstly, that they constitute an extension of the accepted rules of international law, and, secondly, because of the absence of any provision to the effect that where the detention of the aircraft has taken place in circumstances which are subsequently made the subject of prize court proceedings, and the capture is held to be invalid, the crew and passengers of the aircraft should be released unconditionally.

Article 37

Members of the crew of a neutral aircraft which has been detained by a belligerent shall be released unconditionally, if they are neutral nationals and not in the service of the enemy. If they are enemy nationals or in the service of the enemy, they may be made prisoners of war.

Passengers are entitled to be released unless they are in the service of the enemy or are enemy nationals fit for military service, in which cases they may be made prisoners of war.

Release may in any case be delayed if the military interests of the belligerent so require.

The belligerent may hold as prisoners of war any member of the crew or any passenger whose service in a flight at the close of which he has been captured has been of special and active assistance to the enemy.

The phrase "prisoner of war" in its narrower sense is applied to the combatant and non-combatant members of the armed forces of the belligerent (see article 3 of the Land Warfare Regulations). It is used in articles 36 and 37 in a broader sense and is applied to passengers or members of the crew of neutral and enemy aircraft who may not be members of the belligerent armed forces at all. To avoid any risk of doubt as to the treatment to which such persons are entitled, article 38 lays down that their treatment shall not be less favourable than that to which members of the armed forces are entitled.

Article 38

Where under the provisions of articles 36 and 37 it is provided that members of the crew or passengers may be made prisoners of war, it is to be understood that, if they are not members of the armed forces, they shall be entitled to treatment not less favourable than that accorded to prisoners of war.

CHAPTER VI

BELLIGERENT DUTIES TOWARDS NEUTRAL STATES AND NEUTRAL DUTIES TOWARDS BELLIGERENT STATES

To avoid any suggestion that it is on the neutral Government alone that the obligation is incumbent to secure respect for its neutrality, article 39 provides that belli-

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gerent aircraft are under obligation to respect the rights of neutral Powers and to abstain from acts within neutral jurisdiction which it is the neutral's duty to prevent.

It will be noticed that the article is not limited to military aircraft; in fact, the second phrase will apply only to belligerent aircraft of other categories, as it is they alone which may remain at liberty within neutral jurisdiction. All aircraft, however, including military, are bound to respect the rights of neutral Powers.

Article 39

Belligerent aircraft are bound to respect the rights of neutral Powers and to abstain within the jurisdiction of a neutral State from the commission of any act which it is the duty of that State to prevent.

The principle that belligerent military aircraft should not be allowed to enter or circulate in neutral jurisdiction met with ready acceptance. It is in conformity with the rule adopted by the European States during the recent war.

The immunities and privileges which article 17 confers on flying ambulances will enable the neutral State to admit them to its jurisdiction, if it sees fit.

Article 40

Belligerent military aircraft are forbidden to enter the jurisdiction of a neutral State.

The customary rules of international law authorize the admission of belligerent warships to neutral ports and waters. There is no obligation upon neutral States to admit warships belonging to belligerent States, but it is not in general refused. The admission of belligerent military aircraft, however, is prohibited by article 40, and account must therefore be taken of the fact that it has now become the practice for warships to have a certain

number of aircraft assigned to them and that these aircraft usually rest on board the warship. While they remain on board the warship they form part of it, and should be regarded as such from the point of view of the regulations issued by the neutral States. They will therefore be allowed to enter the neutral jurisdiction on the same footing as the warship on board which they rest, but they must remain on board the warship and must not commit any act which the warship is not allowed to commit.

Article 41

Aircraft on board vessels of war, including aircraft-carriers, shall be regarded as part of such vessels.

The principle is well established in land warfare that combatant forces of a belligerent must not penetrate within neutral jurisdiction. If they do, they are beyond the reach of their enemy: they have entered what is to them an asylum, and consequently, if after their visit to neutral territory they were allowed to re-enter hostilities, they would be making use of neutral territory to the detriment of their adversary.

From this principle arises a duty, which is incumbent on all neutral States, to do what they can to prevent combatant forces from entering their jurisdiction, and to intern those which do. These principles are recognized and adopted for aerial warfare by article 42. The obligation to intern covers also aircraft which were within the neutral jurisdiction at the outbreak of hostilities.

Where aircraft and their personnel are in distress and seek shelter in neutral territory, knowing that their fate will be internment, or where the entry is due to the fact that the aircraft has lost its bearings or experienced engine trouble or run out of fuel, the neutral State is under no obligation to exclude them; it is, in fact, morally bound to admit them. This is due to the principle that those who are in distress must be succoured. The prohibition

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in the article is aimed at those who enter in violation of the rights of the neutral State.

The prohibition on entry into neutral jurisdiction leads naturally to the further obligation incumbent upon neutral States to enforce compliance with the rule. It is beyond the power of any neutral State to ensure that no belligerent military aircraft will ever violate its neutrality; its obligation is limited to the employment of the means at its disposal, conforming in this respect to the phraseology employed in the Convention dealing with the Rights and Duties of Neutral Powers in Maritime War (No. XIII of 1907).

The provision in the article is limited to military aircraft because it is only in respect of such craft that the prohibition on entry is absolute. Under article 12 the admission of private or public non-military aircraft is within the discretion of the neutral State. Where such aircraft penetrate within neutral jurisdiction in violation of the measures prescribed by the neutral Power, they will be subject to such penalties as the neutral Power may enact; these may or may not include internment. Recognition of this fact has enabled the Commission to omit a provision which figured as article 11 in the American draft:—

“A neutral Government may intern any aircraft of belligerent nationality not conforming to its regulations.”

The obligation on the part of the neutral Power to intern covers not only the aircraft, but its equipment and contents. The obligation is not affected by the circumstance which led to the military aircraft coming within the jurisdiction. It applies whether the belligerent aircraft entered neutral jurisdiction voluntarily or involuntarily, and whatever the cause. It is an obligation owed to the opposing belligerent and is based upon the fact that the aircraft has come into an area where it is not subject to attack by its opponent.

The only exceptions to the obligation to intern an aircraft are those arising under articles 17 and 41. The first

relates to flying ambulances. Under the second, an aircraft on board a warship is deemed to be part of her, and therefore will follow the fate of that warship if she enters neutral ports or waters. If she enters under circumstances which render her immune from internment, such aircraft will likewise escape internment.

The obligation to intern belligerent military aircraft entering neutral jurisdiction entails also the obligation to intern the personnel. These will in general be combatant members of the belligerent fighting forces, but experience has already shown that in time of war military aeroplanes are employed for transporting passengers. As it may safely be assumed that in time of war a passenger would not be carried on a belligerent military aircraft unless his journey was a matter of importance to the Government, it seems reasonable also to comprise such passengers in the category of persons to be interned.

Article 42

A neutral Government must use the means at its disposal to prevent the entry within its jurisdiction of belligerent military aircraft and to compel them to alight if they have entered such jurisdiction.

A neutral Government shall use the means at its disposal to intern any belligerent military aircraft which is within its jurisdiction after having alighted for any reason whatsoever, together with its crew and the passengers, if any.

Under article 15 of the Convention for the adaptation of the principles of the Geneva Convention to Maritime War (No. X of 1907), the shipwrecked, wounded or sick members of the crew of a belligerent warship, who are brought into a neutral port, must be interned. The same rule is applied by article 43 to the personnel of a disabled belligerent military aircraft, when the men are brought in on board a military aircraft. It goes without saying that

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such individuals could not be brought in and landed at a neutral port without the consent of the neutral authorities.

Article 43

The personnel of a disabled belligerent military aircraft rescued outside neutral waters and brought into the jurisdiction of a neutral State by a neutral military aircraft and there landed shall be interned.

The principle is well established in international law that in time of war a Government which remains neutral must not itself supply to a belligerent Government arms or war material. For aerial warfare effect is given to this principle by the following article :—

Article 44

The supply in any manner, directly or indirectly, by a neutral Government to a belligerent Power of aircraft, parts of aircraft, or material, supplies or munitions required for aircraft, is forbidden.

No obligation rests on a neutral State to prevent the purchase by a belligerent Government of articles of contraband from persons within the neutral jurisdiction. The purchase of contraband under such conditions constitutes a commercial transaction which the neutral Government is under no obligation to prevent, although the opposing belligerent may take such means as international law authorizes to intercept the delivery of the articles to his enemy. This principle has already been embodied in article 7 of the Convention concerning the rights and duties of neutral Powers in land war (Convention V of 1907) and in article 7 of the corresponding convention for maritime war (Convention XIII of 1907). To apply it to aerial warfare, the following article has been adopted :—

Article 45

Subject to the provisions of article 46, a neutral Power is not bound to prevent the export or transit on behalf of a belligerent of aircraft, parts of aircraft, or material, supplies or munitions for aircraft.

An exception to the principle that a neutral State is under no obligation to prevent the export of arms and war material, is found in the accepted rule of international law that neutral territory must not be utilized as a base of operations by a belligerent Government, and that the neutral State must therefore prevent the fitting out or departure from its jurisdiction of any hostile expedition intended to operate on behalf of one belligerent against the other. Such an expedition might consist of a single aeroplane, if manned and equipped in a manner which would enable it to take part in hostilities, or carrying or accompanied by the necessary elements of such equipment. Consequently, its departure under circumstances which would constitute the despatch of a hostile expedition, must be prevented by the neutral Government.

It is easy to see that it is aircraft which have flown out of the neutral jurisdiction, which are most likely to engage in hostilities in some form before delivery to the belligerent purchaser in the belligerent State, and it is in these cases that the neutral Government must take special precautions. All risk will be avoided if the aircraft, despatched to the order of a belligerent Power, does not come within the neighbourhood of the operations of the opposing belligerent. The neutral State should therefore prescribe the route which the aircraft is to follow. This alone, however, will not be sufficient. The aircraft might ignore the instructions it receives. Guarantees for compliance must therefore be exacted. It will be for the neutral State to determine the guarantees which it thinks necessary, but they must be effective guarantees, such, for instance, as

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insisting on the aircraft carrying a representative of the Government to see that the route indicated is followed.

To meet these requirements, the following article has been adopted :—

Article 46

A neutral Government is bound to use the means at its disposal :—

- 1. To prevent the departure from its jurisdiction of an aircraft in a condition to make a hostile attack against a belligerent Power, or carrying or accompanied by appliances or materials, the mounting or utilization of which would enable it to make a hostile attack, if there is reason to believe that such aircraft is destined for use against a belligerent Power.*
- 2. To prevent the departure of an aircraft the crew of which includes any member of the combatant forces of a belligerent Power.*
- 3. To prevent work upon an aircraft designed to prepare it to depart in contravention of the purposes of this article.*

On the departure by air of any aircraft despatched by persons or companies in neutral jurisdiction to the order of a belligerent Power, the neutral Government must prescribe for such aircraft a route avoiding the neighbourhood of the military operations of the opposing belligerent, and must exact whatever guarantees may be required to ensure that the aircraft follows the route prescribed.

The height to which aircraft can ascend would enable them to be used for observation purposes from a spot within neutral jurisdiction, i.e., within the airspace above neutral territory or territorial waters, if hostilities were in progress close to the frontier between two States. Such proceedings might be extremely harmful to belligerent interests, and if the observations were made on behalf of

one of the belligerents and for the purpose of supplying him with information, would amount to an improper use of neutral territory. To meet this contingency, the following provision has been adopted:—

Article 47

A neutral State is bound to take such steps as the means at its disposal permit to prevent within its jurisdiction aerial observation of the movements, operations or defences of one belligerent, with the intention of informing the other belligerent.

The prohibition of aerial observation within neutral territory on belligerent account must apply equally to the case of aircraft on board belligerent warships when in neutral waters. To avoid all misconception on this point, the following paragraph has been added:—

This provision applies equally to a belligerent military aircraft on board a vessel of war.

The measures which a neutral Government may be obliged to take to compel respect for its rights may entail the use of force; fire may have to be opened on foreign aircraft, even military aircraft of another State. Following the analogy of article 10 of Convention V of 1907 (Rights and Duties of Neutral Powers in Land War) and article 26 of Convention XIII (Rights and Duties of Neutral Powers in Maritime War), it has been thought well to declare that the measures, even of force, taken by a neutral Power for this purpose cannot be regarded as acts of war. Still less could they be regarded as unfriendly acts, seeing that they are taken in specific exercise of rights conferred or recognized by treaty.

It may be well to add that the neutral Government will not be responsible for any injury or damage done to the aircraft or other object.

Article 48

The action of a neutral Power in using force or other means at its disposal in the exercise of its rights or duties under these rules cannot be regarded as a hostile act.

CHAPTER VII

Article 49

Private aircraft are liable to visit and search and to capture by belligerent military aircraft.

Article 50

Belligerent military aircraft have the right to order public non-military and private aircraft to alight in or proceed for visit and search to a suitable locality reasonably accessible.

Refusal, after warning, to obey such orders to alight or to proceed to such a locality for examination, exposes an aircraft to the risk of being fired upon.

The next article deals with the position of a neutral public non-military aircraft. The future of commercial aviation may involve the establishment of State-owned lines of aircraft for commercial purposes. The principle has already been recognized that such aircraft must be treated upon the same footing as private aircraft. Their subjection to the exercise of the right of visit and search and capture must, therefore, be assured. Where public non-military aircraft are not used for commercial purposes, the general rule must apply according to which a belligerent warship can only visit the public vessels of a friendly Power so far as may be necessary for the purpose of ascertaining their character, *i.e.*, by the verification of their papers.

Article 51

Neutral public non-military aircraft, other than those which are to be treated as private aircraft, are subject only to visit for the purpose of the verification of their papers.

Article 52 applies to aircraft in time of war the principle which already obtains in the case of merchant vessels, namely, that an enemy merchant vessel is liable to capture in all circumstances.

Article 52

Enemy private aircraft are liable to capture in all circumstances.

The next article deals with the grounds upon which a neutral private aircraft may be captured.

(a) The first is where it resists the legitimate exercise of belligerent rights. This is in harmony with article 63 of the Declaration of London. As first submitted to the Commission, the text included the words "or flees." On due consideration, however, these words were omitted. The reasons for this omission cannot be stated better than is done in the report on article 63 of the Declaration of London, prepared by M. Renault :—

"If the vessel is stopped, and it is shown that it was only in order to escape the inconvenience of being searched that recourse was had to flight, and that beyond this she had done nothing contrary to neutrality, she will not be punished for her attempt at flight. If, on the other hand, it is established that the vessel has contraband on board, or that she has in some way or other failed to comply with her duty as a neutral, she will suffer the consequences of her infraction of neutrality, but in this case, as in the last, she will not undergo any punishment for her attempt at flight. Expression was given to the contrary view, namely, that a ship should

be punished for an obvious attempt at flight as much as for forcible resistance. It was suggested that the prospect of having the escaping vessel condemned as good prize would influence the captain of the cruiser to do his best to spare her. But in the end this view did not prevail.

(b) The second ground for capture is that of the failure of a neutral aircraft to comply with directions given by a belligerent commanding officer enjoining the withdrawal of neutral aircraft from the immediate vicinity of his military operations. By the terms of article 30 a neutral aircraft disregarding such a prohibition is exposed to the risk of being fired upon. It might well be thought that such risk would involve a sufficient deterrent without rendering non-compliance a ground of capture. The reason why capture has been added is due to the peculiar circumstances of warfare in the air. The right to oblige aircraft to avoid the scene of military operations would only be made use of in cases where it was a matter of importance to the belligerent to ensure their absence, and consequently where effective measures must be taken to secure compliance. If a neutral private aircraft is to be fired upon for this purpose, it is desirable to render it as little likely as possible that it shall be fired upon in a way that will involve its destruction. If the airman knows that the aircraft, when forced to alight, may be made the subject of capture, he is less tempted to secure observance of the rule by firing in a way which will involve the destruction of the aircraft.

(c) The third ground for capture is where the aircraft is engaged in unneutral service. This phrase "unneutral service" formed the subject of careful consideration in the Naval Conference of London in 1908 and 1909, at the time when the Declaration of London was framed. The meaning attached to the term by the Commission in the preparation of the present text is that used in articles 45 and 46 of that Declaration, the intention being to render those articles applicable in the case of similar action on the part

of aircraft. For instance, it will cover an act amounting to taking a direct part in hostilities, such as that mentioned in the second paragraph of article 16. The Commission would also refer to that portion of the Report on the Declaration of London which deals with unneutral service (articles 45 and 46) as they are in entire concurrence with it.

(d) The fourth ground for capture is that a neutral private aircraft is armed in violation of article 16, which stipulates that outside its own jurisdiction a private aircraft must not be armed. The carriage of arms by a private aircraft under such circumstances gives rise to a well-founded suspicion of an intention to take part in hostilities in violation of the laws of war.

(e) The fifth ground for capture is that an aircraft has no marks or is bearing false marks in violation of article 19.

(f) The sixth ground for capture is the absence or irregularity of the papers of the aircraft. This rule is in accordance with that which prevails in maritime warfare. The papers which must be carried are indicated with greater precision in article 54.

(g) The seventh ground for capture is that of an aircraft being found manifestly out of the proper line of its flight as indicated by its papers and where no sufficient reason is found for its presence in that locality. The importance of this rule from the point of view of aerial warfare is due to the ease with which aircraft can be used for reconnaissance work, even though they may be masquerading as neutral aircraft engaged on innocent occupations. It may well be that in any particular case the aircraft will be able to establish the innocence of its presence. It may have been blown out of its course; it may have been compelled to make a deviation to secure supplies; it may even have intentionally deviated for the purpose of avoiding an area in which it considered that military operations were possible. It is therefore to the interests of both parties—the belligerent and the neutral—that ample opportunity for enquiry should be given to the belligerent before exercising his

right of capture. It will only be where the results of such investigations show that there is good cause for suspicion that the aircraft was engaged in some improper operations that capture will be resorted to.

(h) The eighth ground for capture is where the neutral private aircraft carries, or itself constitutes, contraband of war. This sub-head is framed upon the basis that the term "contraband of war" will bear the same meaning as it has in maritime warfare.

(i) The ninth ground for capture is that the aircraft is engaged in a breach of blockade. "Blockade" is here used in the same sense in which it is employed in Chapter 1 of the Declaration of London, that is to say, an operation of war for the purpose of preventing by the use of warships ingress or egress of commerce to or from a defined portion of the enemy's coast. It has no reference to a blockade enforced without the use of warships, nor does it cover military investments of particular localities on land. These operations, which may be termed "aerial blockade," were the subject of special examination by the experts attached to the various Delegations, who framed a special report on the subject for consideration by the Full Commission. The conditions contemplated in this sub-head are those of warships enforcing a blockade at sea with aircraft acting in co-operation with them. As the primary elements of the blockade will, therefore, be maritime, the recognized principles applicable to such blockade, as for instance, that it must be effective (Declaration of Paris, article 4), and that it must be duly notified and its precise limits fixed, will also apply. This is intended to be shown by the use of the words "breach of blockade duly established and effectively maintained" in the text of the sub-head.

It is too early yet to indicate with precision the extent to which the co-operation of aircraft in the maintenance of blockade at sea may be possible; experience alone can show. Nevertheless, it is necessary to indicate the sense in which the Commission has used the word "effective."

As pointed out in the Declaration of London, the effectiveness of a blockade is a question of fact. The word "effective" is intended to ensure that it must be maintained by a force sufficient really to prevent access to the enemy coast-line. The prize court may, for instance, have to consider what proportion of surface vessels can escape the watchfulness of the blockading squadrons without endangering the effectiveness of the blockade; this is a question which the prize court alone can determine. In the same way, this question may have to be considered where aircraft are co-operating in the maintenance of a blockade.

The invention of the aircraft cannot impose upon a belligerent who desires to institute a blockade the obligation to employ aircraft in co-operation with his naval forces. If he does not do so, the effectiveness of the blockade would not be affected by failure to stop aircraft passing through. It is only where the belligerent endeavours to render his blockade effective in the air-space above the sea as well as on the surface itself that captures of aircraft will be made and that any question of the effectiveness of the blockade in the air could arise.

The facility with which an aircraft, desirous of entering the blockaded area, could evade the blockade by passing outside the geographical limits of the blockade has not escaped the attention of the Commission. This practical question may affect the extent to which belligerents will resort to blockade in future, but it does not affect the fact that where a blockade has been established and an aircraft attempts to pass through into the blockaded area within the limits of the blockade, it should be liable to capture.

The Netherlands Delegation proposed to suppress (i) on the grounds that air blockade could not be effectively maintained, basing its opinion on its interpretation of the experts' report on the subject.

The British, French, Italian and Japanese Delegations voted for its maintenance. The American Delegation voted for its maintenance *ad referendum*.

(k) The tenth ground for capture is that the private aircraft has been transferred from belligerent to neutral nationality with a view to escaping the disadvantages which enemy status confers upon aircraft. This sub-head has been inserted in order that so far as possible the rules applicable to maritime warfare should apply to warfare in the air.

The sub-head as adopted does not embody the detailed provisions of the Declaration of London (articles 55 and 56) because those articles constituted a compromise between two competing principles and have not stood the test of experience.

The sub-heads enumerated above comprise those which the Commission has considered sufficient to justify capture. Experience may show that other cases will arise in which capture may be necessary, as great development may yet occur in the science of aviation.

The article concludes with a proviso that the act which constitutes the ground of capture must have occurred in the course of the flight in which the neutral aircraft came into belligerent hands. This proviso would not, of course, apply to the case of transfer from belligerent to neutral nationality.

Account must also be taken of the special case provided for in article 6 of the rules for the control of radio in time of war under which merchant vessels or aircraft transmitting intelligence may in certain circumstances be liable to capture for a period of one year from the commission of the act complained of.

Article 53

A neutral private aircraft is liable to capture if it—

- (a) *Resists the legitimate exercise of belligerent rights.*
- (b) *Violates a prohibition of which it has had notice issued by a belligerent commanding officer under article 30.*
- (c) *Is engaged in unneutral service.*

- (d) *Is armed in time of war when outside the jurisdiction of its own country.*
- (e) *Has no external marks or uses false marks.*
- (f) *Has no papers or insufficient or irregular papers.*
- (g) *Is manifestly out of the line between the point of departure and the point of destination indicated in its papers and after such enquiries as the belligerent may deem necessary, no good cause is shown for the deviation. The aircraft, together with its crew and passengers, if any, may be detained by the belligerent, pending such enquiries.*
- (h) *Carries, or itself constitutes, contraband of war.*
- (i) *Is engaged in breach of a blockade duly established and effectively maintained.*
- (k) *Has been transferred from belligerent to neutral nationality at a date and in circumstances indicating an intention of evading the consequences to which an enemy aircraft, as such, is exposed.*

Provided that in each case (except (k)) the ground for capture shall be an act carried out in the flight in which the neutral aircraft came into belligerent hands, i.e., since it left its point of departure and before it reached its point of destination.

By custom and tradition practical uniformity has arisen as to the papers which a merchant vessel is expected to carry. There is no serious divergence between the legislation now in force in civilized countries. No practical inconvenience, therefore, arises in the application of the established rule of maritime war, that a vessel is liable to capture if it has no papers or if the papers are irregular. Similar uniformity would no doubt in time arise in connection with aircraft, particularly if the Air Navigation Convention of 1919 becomes universal. It has, however, been thought prudent to indicate in a special article the facts which the papers found on board an aircraft must indicate if its papers are to be held sufficient. Under

article 6 the papers to be borne by an aircraft are those prescribed by the laws of its own State. The forms, names and number of such papers are therefore a matter to be determined by each State except so far as it may already be bound by treaty stipulations. Article 54 prescribes the points that must be established by such papers, that is to say, it ensures that the papers shall give the belligerent information on the points which it is important for him to know. They must show the nationality of the aircraft, the names and nationality of the crew and the passengers, the points of departure and destination of the flight, particulars of the cargo, and must include the necessary logs. The legislation in force in each State must be sufficient to satisfy this rule if it desires that its aircraft shall escape trouble in time of war. It is not thought that the article will involve any inconvenience, as legislation which would not prescribe at least as much as the above on this subject of aircraft is unlikely to be enacted by any State.

Article 54

The papers of a private aircraft will be regarded as insufficient or irregular if they do not establish the nationality of the aircraft and indicate the names and nationality of the crew and passengers, the points of departure and destination of the flight, together with particulars of the cargo and the conditions under which it is transported. The logs must also be included.

The practice has now become universal for belligerent States to institute a prize court in which proceedings will take place for adjudicating on all cases of capture of ships or goods effected in maritime war. It is in the interest of neutrals that this system has been developed. If aircraft are to be allowed to exercise the belligerent right of capture, it is only proper that the same protection should be accorded to neutrals as in the case of captures effected by

warships. This view has readily obtained unanimous assent, and is embodied in article 55.

Article 55

Capture of an aircraft or of goods on board an aircraft shall be made the subject of prize proceedings, in order that any neutral claim may be duly heard and determined.

The provisions of articles 52 and 53 deal only with the grounds for capture. They do not prescribe the rule which is to be applied by the prize court. Reflection has led the Commission to the view that, save in certain exceptional cases where aircraft will have been captured for reasons peculiar to aerial warfare, the decisions of the prize courts in adjudicating on captures effected by aircraft, should proceed on the same principles as those which obtain in captures by warships. If the jurisdiction of the prize courts is to apply in aerial warfare as well as in maritime warfare, it is convenient that the rules applied should be the same in both cases. It would be impossible to frame an exact code, at the present stage, of the rules which prize courts apply, nor indeed would it be within the competence of this Commission to do so as far as concerns maritime warfare. It would certainly lead to divergence between rules applied in the case of aerial captures and those applied in the case of maritime captures. The simplest solution has therefore been found in the adoption of the principle that the prize court should apply the same rules in both cases.

The special cases which have to be provided for are those where an aircraft has no marks or has used false marks, or has been found armed in time of war outside the jurisdiction of its own country, and also in the case where a neutral aircraft has violated the rule that it must not infringe the directions of the belligerent commanding officer to keep away from the immediate vicinity of his military operations.

In these cases it is agreed that the aircraft should be liable to condemnation.

Article 56

A private aircraft captured upon the ground that it has no external marks or is using false marks, or that it is armed in time of war outside the jurisdiction of its own country, is liable to condemnation.

A neutral private aircraft captured upon the ground that it has disregarded the direction of a belligerent commanding officer under article 30 is liable to condemnation, unless it can justify its presence within the prohibited zone.

In all other cases, the prize court in adjudicating upon any case of capture of an aircraft or its cargo, or of postal correspondence on board an aircraft, shall apply the same rules as would be applied to a merchant vessel or its cargo or to postal correspondence on board a merchant vessel.

The destruction of neutral merchant vessels first came into prominence as a belligerent practice at the time of the Russo-Japanese War. It was not without difficulty that an agreement was reached between the Powers as to the extent to which the practice should be recognized in maritime war. In the case of enemy vessels, the practice has always been recognized as legitimate, subject to the over-riding principle that the persons on board must be placed in safety and the papers of the vessel must be secured. This principle has been adapted to aerial warfare by article 57, of which the text is as follows:—

Article 57

Private aircraft which are found upon visit and search to be enemy aircraft may be destroyed if the belligerent commanding officer finds it necessary to do so, provided that all persons on board have first been placed in safety and all the papers of the aircraft have been preserved.

The articles dealing with the destruction of neutral aircraft are largely based upon the provisions of the Declaration of London, but the language used is of a more restrictive character, so as to reduce the possibilities of an abuse of the practice, as happened in the late war. Destruction is limited to cases where an aircraft is captured in circumstances which show that it would be liable to condemnation on the ground of unneutral service, or on the ground that it has no marks or bears false marks. Apart from these cases, destruction can only be justified by the existence of grave military emergencies which would not justify the officer in command in releasing the aircraft. In all cases, destruction must be justified by the circumstance that sending the aircraft in for adjudication would be impossible, or would imperil the safety of the belligerent aircraft or the success of the operations in which it is engaged.

Article 58

Private aircraft which are found upon visit and search to be neutral aircraft liable to condemnation upon the ground of unneutral service, or upon the ground that they have no external marks or are bearing false marks, may be destroyed, if sending them in for adjudication would be impossible or would imperil the safety of the belligerent aircraft or the success of the operations in which it is engaged. Apart from the cases mentioned above, a neutral private aircraft must not be destroyed except in the gravest military emergency, which would not justify the officer in command in releasing it or sending it in for adjudication.

The safeguards designed to ensure full protection for neutral interests in the case of any such destruction are embodied in article 59. The persons on board must be placed in safety. The papers must be secured in order that they may be available in the forthcoming prize court proceedings. The captor must then bring the case before the

prize court and must establish, firstly, the need for destruction, and, secondly, when that is established, the validity of the capture. Failure to establish the first point will expose him to the risk of paying compensation to all the parties interested in the aircraft and its cargo. Failure to establish the second will place him in the same position in which he would be if the aircraft had not been destroyed, and he had been ordered to make restitution of the aircraft or cargo improperly captured.

Article 59

Before a neutral private aircraft is destroyed, all persons on board must be placed in safety, and all the papers of the aircraft must be preserved.

A captor who has destroyed a neutral private aircraft must bring the capture before the prize court, and must first establish that he was justified in destroying it under article 58. If he fails to do this, parties interested in the aircraft or its cargo are entitled to compensation. If the capture is held to be invalid, though the act of destruction is held to have been justifiable, compensation must be paid to the parties interested in place of the restitution to which they would have been entitled.

The special case of the destruction of contraband on board an aircraft, apart from the destruction of the aircraft itself, is dealt with in article 60, which proceeds on lines similar to article 54 of the Declaration of London. After the contraband has been destroyed, the aircraft will be allowed to continue its flight. Similar provision is made for the protection of neutral interests as under the preceding articles.

The article as adopted is limited to absolute contraband, but three Delegations considered that the word "absolute" should be deleted, and that the article should extend to all forms of contraband, as in article 54 of the Declaration of London.

Article 60

Where a neutral private aircraft is captured on the ground that it is carrying contraband, the captor may demand the surrender of any absolute contraband on board, or may proceed to the destruction of such absolute contraband, if sending in the aircraft for adjudication is impossible or would imperil the safety of the belligerent aircraft or the success of the operations in which it is engaged. After entering in the log book of the aircraft the delivery or destruction of the goods, and securing, in original or copy, the relevant papers of the aircraft, the captor must allow the neutral aircraft to continue its flight.

The provisions of the second paragraph of Article 59 will apply where absolute contraband on board a neutral private aircraft is handed over or destroyed.

CHAPTER VIII

DEFINITIONS

In some countries, the word "military" is not generally employed in a sense which includes "naval." To remove any ambiguity on this point a special article has been adopted.

Article 61

The term "military" throughout these rules is to be read as referring to all branches of the forces, i.e., the land forces, the naval forces and the air forces.

Article 62 is intended to remove all risk of doubt as to whether aircraft personnel should, in matters not covered by these rules or by conventions as to the application of which there can be no doubt, be governed by the Land

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Warfare Regulations or by the unwritten rules governing maritime war. The rules to be applied are those contained in the Land Warfare Regulations. Regard must be had to the last paragraphs of the Convention to which the Land Warfare Regulations are attached, that cases not provided for are not intended, for want of a written prohibition, to be left to the arbitrary judgment of military commanders. In all such cases the population and belligerents are to remain under the protection of the rule of the principles of the law of nations, as they result from the usages established between civilized nations, from the laws of humanity and the requirements of the public conscience.

The French Delegation expressed the opinion that the terms of article 62 were hardly adequate to cover a subject so complex.

Article 62

Except so far as special rules are here laid down and except also so far as the provisions of Chapter VII of these Rules or international conventions indicate that maritime law and procedure are applicable, aircraft personnel engaged in hostilities come under the laws of war and neutrality applicable to land troops in virtue of the custom and practice of international law and of the various declarations and conventions to which the States concerned are parties.

Jurisdiction

The British draft code contained an article (No. 9) stipulating that for the purpose of the proposed rules, territory over which a Power exercises a protectorate or a mandate, and also protected States, should be assimilated to the national territory of that Power. The Japanese Delegation drew attention to the necessity of providing also for the case of leased territories if any such article were adopted. Throughout the articles adopted the word "jurisdiction" is used. The Commission has considered

the question whether it is necessary to add a definition of the word "jurisdiction," and has come to the conclusion that it would be better not to do so. The area within which each State is responsible is well understood; no difficulty of this sort arises in practice; and no inconvenience has been caused by the absence of any such definition from Convention No. XIII, of 1907, in which the word "jurisdiction" is used in a manner very similar to that in which it is used in the present rules.

COMPENSATION AND DISPUTES

The Netherlands Delegation submitted the following proposal:—

"The belligerent Party who, intentionally, or through negligence, violates the provisions of the present rules is liable to pay compensation in case damage is caused as a result of such violation. Such Party will be responsible for all acts committed by members of his armed forces.

"If any dispute should arise on the subject which is not otherwise settled, such dispute shall be submitted for settlement to the Permanent Court of Arbitration, in conformity with Convention I of 1907, or to the Permanent Court of International Justice, in respect of such States as have accepted as compulsory *ipso facto* its jurisdiction."

The Commission approving the principle of indemnity, decided to incorporate the proposal in its general report, so as to bring it to the attention of the Governments.

VIOLATION OF THE RULES

No provision is made in the articles adopted as to the penalties to which persons violating the rules are to be subject. Some of the provisions in the drafts laid before the Commission stated that persons violating the article in question were to be punishable with death, or were to

be treated as war criminals. No such stipulation figures in the Land Warfare Regulations and it has seemed better to omit it. Its absence will not in any way prejudice the imposition of punishment on persons who are guilty of breaches of the laws of aerial warfare.

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ALBERT HENRY WASHBURN.

British Empire :

RENNELL RODD.

CECIL J. B. HURST.

France :

A. DE LAPRADELLE.

BASDEVANT.

Italy :

V. ROLANDI RICCI.

Japan :

K. MATSUI.

M. MATSUDA.

Netherlands :

A. STRUYCKEN.

VAN EYSINGA.

The Secretary-General :

J. P. A. FRANÇOIS.

The Hague, February 19, 1923.