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THE ROMANCE OF THE FLYING MAIL



Air, sea, and land; a study in modern flight—the machine being one of the big four-engined 'planes of the Empire air-mail

THE ROMANCE OF THE FLYING MAIL

A Pageant of Aerial Progress

BY

HARRY HARPER

AUTHOR OF "THE EVOLUTION OF THE FLYING MACHINE"

AND

ROBERT BRENARD

METEOROLOGIST TO THE WORLD'S FIRST DAILY AIR EXPRESS



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DEDICATION

It is to the Directors and Staff of Imperial Airways, who are now establishing our British mercantile air service with traditions as fine as those which inspire our British mercantile marine, that we take keen pleasure in dedicating this book, dealing as it does with the history of the flying mail from the earliest days to the present time.

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INTRODUCTION

WHAT a splendid record of achievement, what a pageant of progress, the history of the flying machine affords! And what a romance underlies the story—which we tell in these pages—of the development of the aerial mail!

Just on thirty years ago it is, now, since the first Wright biplane flew for 12 seconds; and five years after that came the milestone of the first cross-Channel flight, Blériot's 25 h.p. monoplane bearing him from France to England in 37 minutes. It was ten years later, in 1919, that a machine carrying a couple of passengers above the Channel turned another page in aerial history by inaugurating the world's first daily air express.

Thus was aerial transport born, and in the first week of that pioneer service one of the airmen flew through a gale attaining a force of 100 miles an hour; while after they had been in operation only three months the London-Paris 'planes proved so dependable that the Post Office entrusted them with the carriage of His Majesty's mails. And now, to-day, operating in all weathers over thousands of miles, our aerial postmen fly with a reliability of just on 100 per cent.

One of the biggest landmarks, from a British point of view, came nine years ago, when all the air companies then flying were merged in our one national enterprise of Imperial Airways. Fifteen aircraft were all the Company owned when it began operations. To-day its fleet comprises forty powerful craft, and the mileage of the routes they fly over has increased from 1,000 in

1924 to just on 14,000 in 1933; while as for the growth in air-mail loads, our British machines now carry millions of letters a year as compared with thousands nine years ago. Air passengers, also, have increased from 11,000 a year to more than 60,000, and the consignment of urgent freight has grown year by year until at the present time, during busy spells, fifty or sixty tons are air-borne in and out of Croydon weekly.

Away back in 1919 our London air-port was represented by just a few converted war-time sheds, through which passed about thirty passengers a week; but to-day we have our splendidly-equipped air-port of London at Croydon, which cost £260,000, and in and out of which, at busy periods, pass several thousand passengers weekly in their flights to and fro above the Channel; while in no phase of air-mail transport has development been more marked than in the aircraft used from year to year. In 1919 the first small machine carried two passengers. A year later machines were carrying eight passengers; following which came aircraft carrying from nine to fourteen people. Then in 1926 we saw the introduction of three-engined British air-liners with accommodation for nineteen passengers. In 1931, as another vital step, we reached the four-engined machines which, cruising at 105 miles an hour, carry thirty-eight passengers; while this year we have seen the introduction on the African and Indian air-lines of four-engined monoplanes which cruise at 120 miles an hour, when carrying a couple of tons of mails, passengers, and freight, and are capable of a maximum of 150 miles an hour. And the big modern mail-plane is not only luxurious and reliable, and capable of high speeds, but is also a far better proposition, commercially, than were those of early days. Whereas, for example, the 'plane instituting the first daily service carried only

about one pound of paying load per horse-power, the air-liner of to-day, combining speed with an ample reserve of power, has a pay-load capacity of well over three pounds per horse-power, and technical development now promises, in due course, figures which should grow progressively better.

From the first—as it will be our purpose in this book to show—one of the chief tasks of British air transport has been to concentrate upon the development of trans-Empire air-mails. In 1929, utilizing the experience gained on Continental routes, our first Imperial air-line, extending for 5,000 miles from England to India, was inaugurated. In 1931 came the initial sections of the route to South Africa, followed the next year by the completion of the service of 8,000 miles between London and Cape Town; and now to-day, stage by stage, the Indian air-mail is being continued on to Australia. Already, at the time of writing, this route has been extended across India to Calcutta. Another section will soon take it to Rangoon; followed by other links on to Singapore, where it is to connect with a service operated by Australian air transport from Port Darwin. In this way, when all the links in this great air-chain have been forged, we shall operate a 10,000 miles air-mail right through from England to Australia, flying at first to a time schedule of approximately twelve days. And this Australian route will, in due course, have an extension to New Zealand, and another to China.

It is in the aerial transport of mails over long distances that such important developments now impend. One project, for example, to which special attention is being directed, is that for a British air-mail across the Atlantic, connecting with the air system of Canada, and this providing, ultimately, new trunk routes over the Pacific to other parts of the British Dominions. And,

when the Pacific as well as the Atlantic is spanned by a regular flying mail, civil aviation will be in sight of its ambition of an aerial network which completely encircles the globe.

As it is, and during fourteen years of progress, the flying mail has given the amplest proofs of its speed, safety, and reliability. From 3,000 miles of air-mail routes, in the year 1919, we have advanced to 205,000 in 1933; while within the British Empire we now have 28,000 miles of air-lines, with nearly another 20,000 in process of being surveyed or developed. To-day our air-mail portents are definitely encouraging. Loads are increasing. Operating costs are decreasing. And our British policy now is, as it has always been, to continue the development of our air-mail system, on an Empire scale, until it achieves its goal of economic independence and is able—as Mr Churchill once said must be the case—to "fly by itself" without any need for further assistance from the State.

H.H.
R.B.

London, September, 1933.

CHAPTER I

THE FIRST AIR-BORNE LETTERS

A romance of reality—Montgolfiers' hot-air balloon—Their experiments 150 years ago—Blanchard and Lunardi—Gypson's letter by air—The balloon post at the siege of Paris—Engine-driven airships—Henson's scheme for a steam-driven monoplane

FROM 12 miles an hour to 120! There, in one brief, preliminary sentence, you have an epitome of the speed of mail transport from the old stage-coach to our latest mail-planes, the fruit of fourteen years of aerial travel, which are now flying along sections of our Empire airways to India and Africa.

No story in the world is more fascinating, or more important, than that of man's ceaseless efforts to quicken his means of communication. For in transport—in the increased facility of communication—lies a key to human progress. The Romans built their Empire on it, thrusting roads in all directions. The British Empire grew on its sea routes. And now to-day we are knitting that Empire still more closely together by our latest and greatest triumph, the high-speed modern mail-plane.

One sees, when one looks back over this great pageant, a long and early phase of slow movement, during which mails went no faster than horses could carry them. From far back in the past, indeed, and on up to the nineteenth century, transport was a tedious affair, passengers and mails proceeding at a jog-trot pace of not more than about 10 or 12 miles an hour.

Then, however, came steam and electricity, and after that the petrol engine. And it was with the advent of steam that land-speed went up to 40 miles an hour, and that of the sea to about 20 miles an hour. So we entered that all-important phase which, at the present day, gives us the 27 miles an hour of fast liners, the 55 miles an hour of modern express mail-trains, and the 100 or 120 miles an hour of the long-distance Empire flying mail.

Yet how many of those who, at the present time, send 40,000 or more letters a week by air to India, or who consign mails by airway to the heart of Africa, pause to think of the wonderful story which, following the first experiments of years ago, is now leading to a world-wide development of aerial mails, enabling us to send letters to points thousands of miles away, and obtain replies, in less than the time required for a single journey by any other means?

Yet this story is unique. There has been nothing like it before, in the history of transport. It is a romance of reality—the coming true of a dream which was in men's minds away back in that dim past when, strapping wings to their shoulders, they sprang from hill-tops and towers in a vain emulation of the birds. And now to-day, could some of those "bird-men" of the past but return for an hour to our modern world, they would gaze amazed upon airway arrival and departure platforms from which our mail traffic of the skies is conducted with all the precision of science—winged machines passing swiftly along their ordered routes, and the airway controller annihilating distance by wireless telephone between his lofty tower and the great mail-carrying 'planes in flight.

But, just for a moment, let us in our mind's eye turn back the hands of time to that day—150 years ago it is now—when Stephen Montgolfier, at Avignon in

France, was writing to his brother Etienne. "Get ready at once some silk and cords", wrote Stephen, "and I will show you one of the most astonishing things in the world." And that "astonishing thing" was to make a hollow ball or bag of paper or silk and, after filling it with heated air, to watch it leave the table on which it stood and rise gracefully to the ceiling. So, in such simple experiments, and in others in which soap-bubbles were filled with hydrogen, was aeronautics really born, and the first steps taken which led to the carriage of letters by balloon, and after that, stage by stage, to the world's aerial network of the present day, extending over 200,000 miles.

Soon, after those first indoor tests, the Montgolfiers were making trials on a bigger scale. Hot-air balloons were released in the open air, and ascended to considerable heights. After which it was not long before the King and Queen of France, and a great audience of distinguished folk, saw a balloon soar up from Versailles, carrying in a basket slung beneath it the first living creatures which ever left the ground by mechanical means—a sheep, a cock, and a duck. A memorable scene, that! So excited were the ladies of the Court that, though rain fell, they risked the spoiling of their beautiful costumes, and complexions, rather than miss the sight of that balloon, with its queer cargo of animal passengers, ascending above their heads.

Away through the sky sailed that hot-air balloon, making history as it went. Then two amazed gamekeepers, patrolling a wood, saw it come floating gently down. It only just bent the branches of the trees upon which it alighted, and the wicker cage sank to the ground without hurting its living occupants. Whereupon a clamour arose. If animals could voyage through the air without ill-effect, why should not a man attempt a

similar voyage? The King was asked what he thought. He suggested that the experiment might be tried with two criminals who had been condemned to death, and were awaiting execution, the idea being that if they came down alive they should be given their pardon. Here it was, however, that Pilatre De Rozier, an ambitious young chemist, came boldly upon the scene. Was it right, he asked, that two vile criminals should have the imperishable glory of being the first men to go up into the air? Let him, he pleaded, have the honour. The King listened, and altered his mind, saying that De Rozier could, if he felt ready to take the risks, make the great experiment. Whereupon a big, gaily-painted balloon was made ready in which, standing on a gallery and feeding a fire with straw, De Rozier rose eighty feet into the air and descended safely. Thus, away back in the infancy of flight, long before the advent of the aeroplane, was De Rozier the first man to leave the earth's surface in any kind of aerial craft. That first ascent, however, was a captive one, the balloon being held by a rope, and De Rozier made little of the feat when, on descending, he was surrounded by a great throng of admirers. That was nothing, he said. What he really wanted was to sail freely through the air, making an uninterrupted voyage from point to point. And this ambition he realized shortly afterwards, passing right over Paris, to the amazement of its population, the passenger he carried with him being none other than the Marque d'Arlande, a cousin of the King.

Thus dawned the era of balloons, not only of the hot-air type, but those also which were filled with hydrogen. Lunardi, another maker of early aerial history, was soon floating above England—the first to make a balloon voyage in this country. Blanchard, another pioneer, succeeded in crossing the Channel by

balloon. And it was a visit which Blanchard paid to America in 1793 which gave rise to a constantly repeated story—never, however, substantiated—as to the first letter carried by balloon. Blanchard, it was said, while making ascents in the United States, took up with him a letter signed specially by George Washington, and which, could it only be traced to-day, collectors would be willing to pay a very handsome sum indeed for. The supposed existence of this first air-borne letter has become one of the legends of the early days of aeronautics. It crops up again and again. Not long ago a group of collectors instituted fresh inquiries, letting it be known that, should the letter be discovered, they would be prepared to pay £8,000 for it. But all such quests have proved in vain, and, on the face of things, the whole story is considered highly improbable, more particularly because Blanchard himself, in his various writings, has made no mention of the matter. While he was in America he wrote a pamphlet dealing with his ascents, but there is not a word in it which would throw any light on this problem of the letter; and the same applies to other pamphlets and reports written by this great pioneer who made, altogether, more than sixty ascents. A mystery it was, then, and a mystery it remains to-day. If it ever existed, and if Blanchard ever took it up with him, this letter seems to have vanished utterly.

Many other stories there are, which it seems impossible to prove or disprove nowadays, of letters and documents air-borne in early balloons. Pages might be filled with them; but, to leave the realm of speculation for that of fact, there seems no doubt but that in 1841, while he was giving a balloon demonstration at Lympne, a well-known aeronaut named Gypson did actually take up a letter with him under

circumstances which made the occasion one of unusual historical interest.

It was at just about that time that postage stamps were being introduced, and Gypson announced his intention of being the first to take up a stamped letter with him in a balloon. So, just before one of the ascents he was making at Lympne, he bought a stamp and wrote a letter to an antiquary, John Fillinham, emphasizing that this would be the first stamped letter to be dropped from the air. With the letter he also enclosed one of his handbills, and taking up the letter with him for a short ascent, threw it from his balloon when he was some distance up in the air near Lympne. The letter was picked up and, in due course, handed to its recipient. And it was not long after this that William Samuel Henson registered his patent for a big steam-driven craft which was to carry mails through the air. But though Mr Roebuck, the Member for Bath, moved in the House of Commons for leave to introduce a Bill incorporating an aerial transit company, this ambitious plan never went beyond the stage of building models, and it was not until the Franco-German war of 1870-71, when Paris was besieged, that there was any systematic carriage of letters by air. The French Government, in order to effect communication with the outside world, organized in Paris a balloon post which, throughout the siege, effected just on seventy mail-carrying flights, during which thousands of missives were air-borne out of the beleagured capital. But, though it served its purpose in a limited way, this balloon post revealed, only too clearly, the disadvantages inherent in a type of air machine which merely drifted with the wind, and could not be guided in any specific direction. In fact, though ascents were only made when conditions appeared favourable, many balloons were lost, and it

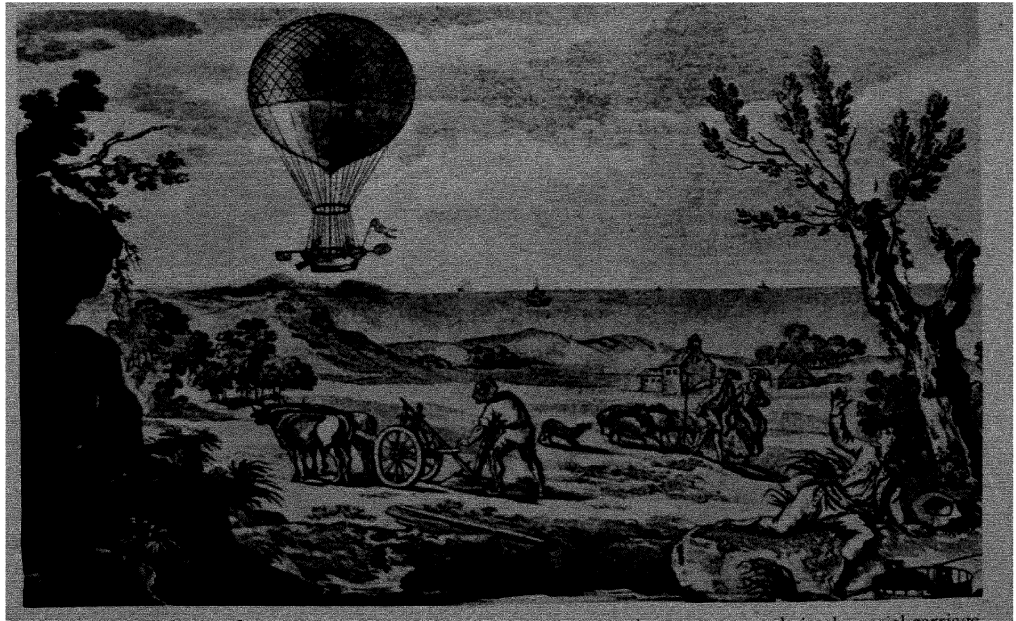
was obvious that nothing practical, or commercially reliable, could be expected from balloon posts. Inventors of course realized this, and attempts were constantly being made to produce navigable or dirigible balloons, which could be made independent of the wind, and could be driven through the air in any direction desired. In the earliest attempts, prior to the employment of mechanical power, the crews of large, cylindrical balloons, occupying boat-shaped cars slung beneath these elongated gas-containers, endeavoured to drive them through the air by sheer muscular power, turning cranks which operated crude propellers or aerial screws. But, though some slight movement was possible in still air, it was quite insufficient for making any headway against the wind, and all such experiments ended in failure. Steam and electricity, when they became available, were also used as the power-plants for early-type airships, and machines such as those of Giffard, Renard, and Tissandier, proved a decided improvement upon previous man-driven airships. Whether of steam or electricity, however, these early plants were heavy and delivered only a very small amount of power ; with the result that the airships to which they were attached flew at slow speeds, and could make reasonable progress only against light breezes. Anything like an all-weather air machine, capable of flying in high or gusty winds, seemed in fact as far off as ever.

So the position remained until, with the coming of the petrol engine, plans took a new and much more ambitious turn. Larger power-driven airships were designed, and, in addition to machines with non-rigid, balloon-type envelopes, dirigibles with their hulls in the shape of rigid frameworks, with gas-containers inside, began to make their appearance. In 1900 the first of the Zeppelins appeared on our aerial stage, its two petrol

motors developing 32 horse-power and driving it at 17 miles an hour. Not much of a speed, that, seeing that it precluded the machine from ascending in anything except favourable weather. Improvements were, however, soon incorporated in Zeppelins which followed, and long flights were accomplished over various parts of Germany, a special interest being found in the fact that in some of these voyages mail-carrying was undertaken, letters being air-borne from town to town, and, in certain instances, boxes being provided in the airships themselves, so that letters could be posted in the machines while they were on the ground before starting, or when halting at intermediate points.

But such demonstrations, though interesting, continued of course to be purely experimental. They were made only under favourable weather conditions, representing at that stage something which might be accomplished occasionally, when the fates were kind, but which could not be relied upon to be performed regularly, because in bad weather these big machines dared not venture from their sheds. The essence of mail transport, however, is that it should function at all times, and in all weather, and that only on the very rare occasions when conditions are completely abnormal should there be any element of delay.

Speed alone is not enough; it is essential, in mail transport, that it should be associated, always, with the highest factors of dependability. And this, for years after the introduction of the first experimental aircraft—not only airships but also aeroplanes—ruled them out of serious consideration as regular carriers of mails. Although, even in their early phases, they could under favourable conditions exceed the speed of surface transport, they were too much at the mercy of the weather, and particularly of the wind, to ensure anything



An early-type balloon of the kind with which, many years ago, experiments were made in the aerial carriage of letters

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like a sufficient dependability, when operating to time-schedules on an all-the-year-round scale. Although, for example, the first fully-controlled aeroplane flight was made in 1903, it was not until sixteen years later, in 1919, that the British Post Office entrusted mails regularly for transport by aeroplane. But that early phase of aeroplane development, so far as mail carriage is concerned, can be dealt with most conveniently in our next chapter.

CHAPTER II

MAIL-CARRYING EXPERIMENTS WITH EARLY 'PLANES

Pioneer aeroplane flights—Air-mail experiments in England—The Blackpool test—The Hendon-Windsor trials—Hamel's fine flight—Other similar tests—French and American progress

JUST on thirty years it is, now, since a journalist on the staff of a New York newspaper, crouching behind some bushes, saw a sight which sent him post-haste to the nearest telegraph office to write and dispatch a wonderful descriptive cable. But when they got that report in New York they tore it up as being fantastic, and suspended the writer of it for six weeks for having put what they considered such nonsense on the wire.

Yet what that reporter had actually seen, hidden behind those bushes, were some of the early flights of Wilbur and Orville Wright in the aeroplane which was the first in the world to show itself capable of being controlled in a free, power-driven movement through the air.

But nobody at that time was prepared to believe that the problem of sustained, man-carrying flight, in an engined machine of the heavier-than-air type, had actually been solved, although people had grown accustomed to seeing balloons aloft, and Santos Dumont had already circled the Eiffel Tower in his tiny airship. It appeared too good to be true, this idea of a really successful aeroplane. It seemed almost impossible to

credit the fact that those two lonely brothers, working unaided in their patient quest, had found practical answers to questions which hitherto had come to be regarded as almost insoluble. Yet while the outside world disbelieved, the farmer whose field the Wrights were flying over grew so accustomed to seeing the aeroplane circling overhead that he merely looked up casually with the remark :

" Them boys are at it again ! "

And " them boys " kept at it until it was not long before authentic proof was forthcoming that they had been making flights for distances of over twenty miles ; at which scepticism gave place to wonder, and they were hailed as the pioneers of a new era, and prophets were busy with predictions as to the revolution which now seemed imminent in the world's communications. But, as usual, anticipation went far ahead of what it was possible actually to accomplish ; and in any case the aeroplane, more especially in its early phase, was a military rather than a commercial proposition. The Wrights themselves realized this, concentrating at first upon their negotiations with Governments, and planning improved machines which would carry an observer as well as a pilot in scouting flights. In fact, though they offered immediate scope as craft for military reconnaissance, early aeroplanes had many disadvantages when viewed from a commercial aspect. The load they could carry was very small. They were difficult to control in high or gusty winds. Their engines, still in a rudimentary stage, were constantly giving trouble. Indeed one pioneer, speaking of the motor installed in one of his first machines, said that he could not reckon upon it running for more than about five minutes without developing a defect of some kind ; which was hardly promising from the aspect of operating any business

service to schedule, or from the viewpoint of the regular carriage of mails. Still, once the first and biggest problems had been solved, technical development went ahead rapidly. In Europe, as well as in America, many experimenters were at work. France, for example, evolved for air use that remarkable revolving motor, the "Gnome", which attained a lightness and a reliability unobtainable hitherto, and which enabled Henry Farman, flying at the Rheims Meeting of 1909, to remain aloft without alighting for more than three hours. At the same time aeroplane speed increased from about 35 miles an hour to 50 or 60 miles an hour; while controls were rendered more efficient. Pilots, too, grew in knowledge and experience, and, feeling that they could place more reliance in their machines, began to venture aloft in higher winds. Thus, although it was recognized that there was still a long way to go before the heavier-than-air machine could be set the task of maintaining, in all weathers, any commercially-scheduled service, progress was considered sufficiently encouraging for a certain number of experiments to be carried out in the transport of bags of letters by aeroplane. Such pioneer tests, as carried out in this country, and also in America and on the continent, took place as a rule at early air meetings, and commemorative stamps and envelopes were sometimes printed for the occasion.

In England the first such trial was made at the Blackpool flying meeting of 1910, the pilot taking part in it being our well-known British pioneer, Mr Claude Grahame-White; and the mail-bag he carried contained a number of specially printed cards, which are now greatly prized by air-mail collectors. It had been intended, as originally planned, that this mail-bag should be air-borne from Blackpool across to Southport; but extremely bad weather, just at the last moment, prevented

this programme from being carried out. Mr Grahame-White managed, however, to effect a cross-country flight with his mails of about seven miles, and this was duly recorded on each card by means of a special inscription in red lettering. What made the occasion specially interesting, apart from its historical significance, was that the airman showed his ability to fly through a really high and gusty wind; thus proving that the aeroplane, when in sufficiently skilful hands, was becoming something more than a mere fine-weather machine.

That first experiment at Blackpool was quite unofficial. The Post Office had nothing to do with it. But in the next year, 1911, a much more ambitious demonstration of aeroplane mail-carrying was organized at the London Aerodrome, and on this occasion the experiment received the sanction of the Postmaster-General, being the first in this country to be recognized by the authorities. The service operated between Hendon and Windsor, and the special envelopes and postcards carried, which were of various colours, bore a design showing Windsor Castle. There was a special postmark, also, containing the words: "First United Kingdom Aerial Post." The experiment was carried out in strict accordance with postal regulations, letters and postcards being posted in special boxes and taken to a central office; after which they were conveyed to the aerodrome for their transport by aeroplane.

One of the flying postmen engaged in these trials was the famous pre-war pilot, Gustav Hamel, who flew a Blériot monoplane with such masterly skill, venturing aloft in winds which, hitherto, had been thought perilous in the extreme for aviators to ascend in. On one occasion, during these trials, in order to show what a pilot who was a master of his art could accomplish, Hamel left Hendon, for Windsor, in a wind attaining

a strength of more than 50 miles an hour. As it happened this wind was behind him, and he managed to accomplish the flight from Hendon to Windsor in not more than ten minutes, at a speed of over 100 miles an hour—a phenomenal performance in those days. Altogether, in these Hendon-Windsor trials, more than 100,000 letters and postcards were air-borne, and the experiment was regarded as being an emphatic success.

Many other similar trials, in the years just prior to the war, were conducted in other countries. In France, for example, semi-official air stamps were issued in connection with mail-carrying flights at the Nantes aviation meeting. In America there was a first officially authorized air-mail in connection with a flying display at Garden City, Long Island. An officially recognized experiment took place in India in conjunction with the United Provinces Exhibition at Allahabad. In South Africa there were trials between Kenilworth and Musenberg, a large number of souvenir postcards being air-borne. Tests were made also in Australia between Melbourne and Sydney, and in Japan between Yokohama and Tokio. And all such experiments were definitely encouraging, drawing attention as they did, in a practical way, to the possibilities of the aeroplane as a mail-carrying machine. Even so, however, the time was not yet ripe for the institution of any regular mail-carrying services by air. Such aeroplanes as were then available, greatly improved though they were as compared with pioneer craft, were not yet powerful enough, or capable of carrying a sufficient load, to render them really suitable for commercial use. It would not have been long, undoubtedly, before commercial exploitation began. Plans were, in fact, actively in shape towards that end just prior to the war. But the outbreak of hostilities in 1914 changed the whole trend of progress, and

commercial air schemes gave place to an intense military activity. And so it was, of course, during all the years of war. And yet out of that immense stimulus, both in design and construction, came the machines which, when hostilities ceased, were found to fly fast enough, and to carry sufficient loads, to enable the world's first civil air services to be embarked upon.

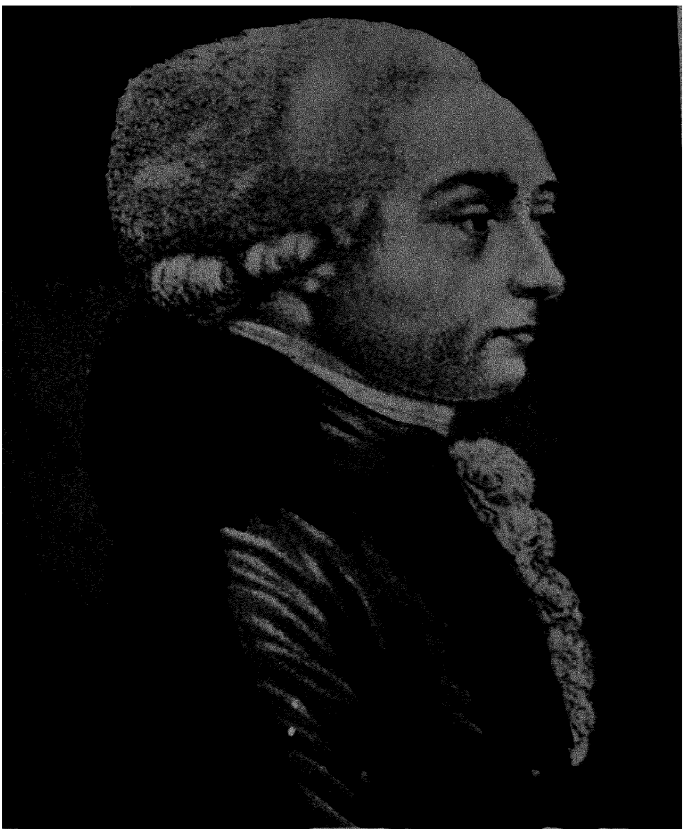
CHAPTER III

THE WAR AND ITS INFLUENCE ON POST-WAR PROGRESS

The Civil Aerial Transport Committee—Formation of commercial department at Air Ministry—The Hawkinge-Cologne R.A.F. mail —World's first daily air express—The Post Office adopts aerial transport—Crisis on our air-lines—The adoption of a subsidy scheme—Development of the ground organization

TOWARDS the end of the war it became apparent that, as soon as hostilities ceased, there would be an immediate scope for the use, commercially, of Service aircraft converted to peaceful rather than to military purposes, and a realization of these possibilities led the British Government, in 1917, to appoint a special committee to review the post-war field of aeronautics, so far as civil development was concerned. The body appointed was large and representative, and was called the Civil Aerial Transport Committee, its chairman being the late Lord Northcliffe. This committee continued its sittings for some considerable time, and presented a report indicating the main avenues of air expansion commercially, and making many valuable suggestions as to the lines upon which air transport progress should be developed and encouraged.

Then, as soon as the war came to an end, there were energetic pioneer moves, in various countries, to establish flying commercially. Under the auspices of the United States authorities, for example, an air post was established between New York, Philadelphia, and Washington; while in France a first section of a South Atlantic air-mail



Blanchard, the famous pioneer balloonist, who has been credited with having taken up with him in America the first letter ever carried by air

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was put into operation between Toulouse and Casablanca. And in Great Britain we saw the formation of a special department in the Air Ministry to handle questions arising in the operation of aircraft commercially, while British civil flying was permitted officially as from May 1st, 1919.

One of the most interesting of the pioneer air-mails in this country was operated by the Royal Air Force, in conjunction with the Post Office, between Hawkinge and Cologne, carrying mails for our Army of Occupation at Cologne. This service was maintained for six months, during which approximately 90 tons of mails were air-borne. In those early days, of course, there were none of the modern facilities which aid pilots when bad weather has to be combated, and this resulted, inevitably, in a certain number of the flights having to be abandoned; but, even so, the service operated during its six months with an average reliability of 60 per cent. and this, under the circumstances, was considered to be extremely encouraging.

It was at this juncture that two great pioneers of British air transport appeared upon the scene. One was Mr G. Holt Thomas, head of the famous Aircraft Manufacturing Company, which had been producing in such large numbers the wonderful De Havilland warplanes; while the other was Mr F. Handley Page, known throughout the world for his big Handley Page bombing craft. Both these pioneers, who were firmly convinced of the great future which lay before civil aviation, instituted commercial air services between London and the continent. Mr Holt Thomas formed an organization known as Aircraft Transport & Travel, which employed as its aircraft machines of the De Havilland type adapted to the carriage of commercial loads; while Mr Handley Page established Handley Page

Transport and turned into commodious passenger craft a number of his twin-engined Handley Page bombers.

A daily British air-line, to and from Paris, was instituted on August 25th, 1919, and, from the first, critics were astonished at the reliability which the aircraft of this service maintained, even in spite of the difficult flying weather which is encountered so often on such a route as this. During the first 20,000 miles' flying, for example, during which eighty-six flights were scheduled, only three interruptions were recorded, one flight being prevented by weather and another interrupted by weather, while a third was delayed owing to a mechanical defect. Even after 40,000 miles' flying, during which thirteen days had been noted officially as "unfit for flying", and thirty described as "unfavourable", the reliability of the service had only been interrupted on seven occasions, one flight having had to be cancelled owing to exceptionally bad weather, while three had been interrupted by weather, and three by mechanical defects.

The postal authorities had refrained, at the start of London-Paris daily flying, from entrusting mails to this service, preferring to wait and observe what factors of reliability could be maintained. The general impression, at that time, was that though an air service might show striking figures in speed, it would be far more difficult for it to demonstrate any factor of reliability which would be adequate for business needs; but after three months, satisfied with the record the service had actually shown, even in the pioneer conditions under which it was operating, the Post Office entered into contracts for the regular dispatch of mails by aeroplane on the continental routes, thus inaugurating a new era of which we are seeing some of the striking fruits to-day. Actually it was on November 10th, 1919, that the first regular

mail-load left the Hounslow Aerodrome for Paris in one of the small, 100 miles an hour 'planes of the daily service.

The fee, then, for the air dispatch of a letter from London to Paris, was as much as half-a-crown, a letter posted during the morning in London being delivered in Paris that same evening. The early patronage of the London-Paris postal air service by the public, though encouraging, was certainly smaller than had been expected. In fact air transport generally, in this first phase, was confronted by problems which, it was quickly realized, could be overcome only by patience and a long-term policy of constructive development. There was obviously no prospect of any short cut to success. For one thing there was a very big inertia to be overcome. People had to be taught to use the air service, just as they have had to be taught to use the telephone service or any other facility of modern life. Furthermore, there was this distinctly adverse factor so far as the flying machine was concerned—people were doubtful about it. They were inclined to regard the whole thing as rather in the nature of a " stunt ", being loath to believe that any aerial service could be operated to schedule, day after day, with the dependability of boat and train services.

One of those who had no illusions as to the big task that lay before air-mail transport, in establishing itself commercially, was Mr Holt Thomas, and, in order to combat the prevailing idea that the aeroplane could not be operated dependably like a boat or train, he published prominently, week by week, the actual figures for reliability of his London-Paris service. These were certainly very striking, and were commented upon favourably. But, generally speaking, British air transport had not the resources necessary for any really big

or sustained campaign of propaganda; and it must be remembered that at this time the Government had pronounced an edict that civil aviation must learn to "fly by itself", and must not expect any form of assistance from the State. This being so, the operators of our aerial services realized that, with the slender resources at their disposal, it was going to be a very big task indeed to weather through a long and difficult period of development and emerge eventually into an era of normal commercial working. As a matter of fact, British air transport was making very encouraging progress, and, on one or two services, seemed at the threshold of commercial success, when it was confronted by a very awkward situation. Operating to and from London, in direct competition with our British services, were foreign air-lines which were in receipt of considerable financial assistance from their authorities; and, profiting by such State assistance, which had been withheld from our British services, they decided to stimulate traffic by a sudden and vigorous policy of rate cutting. This placed our unsubsidized British lines in an impossible situation, it not being feasible for them to lower their fares with any hope of remunerative operation. Appeals were, under the circumstances, made to our authorities to come to the assistance of our services, but for a time they proved unavailing, and our air-lines could, therefore, do nothing but close down. Actually a very sporting offer was made by our British pilots to go on flying for a time without pay in order to keep our routes operating in face of this heavily-subsidized foreign competition. But, even under such conditions, it would have been impossible to carry on, and so for a period of nineteen days we saw our air station at Croydon being used solely by the aircraft of foreign countries, our British 'planes standing idle in their sheds.

That, as can be imagined, was a position which aroused the Press. Strong articles were written, calling upon the authorities to take action. Public opinion was aroused, it being regarded as preposterous that our unsubsidized British air-lines should be driven out of existence by subsidized foreign services, and that the London air station, established and maintained at the taxpayer's expense, should be used solely by the aircraft of other countries.

So the storm rose, soon reaching such a height that the Government found it impossible to ignore it. That previous slogan, that British air transport must " fly by itself ", had to be withdrawn somewhat hastily, and a temporary scheme prepared for the State assistance of our languishing British airways. This plan, put into operation as quickly as possible, provided the aid necessary for our services to re-enter the lists against the subsidized foreign competition, and once more British 'planes, carrying their passengers, mails, and freight, were in flight to and fro between London and the continent. The principle of State assistance for our British air-mail routes having thus been conceded, a more comprehensive scheme was evolved to replace the temporary one which had been first introduced, and this enabled a more extensive programme of civil flying to be instituted.

A good deal of criticism against the subsidizing of British air transport was, as might have been expected, expressed by those who were fundamentally opposed to any such method of State assistance. But, in respect to this highly important industry of operating aircraft commercially, it was possible to make out a good case for a moderate programme of Government aid. The airway, in its high-speed carriage of mails, offers a convenience to the public which there is every inducement

to encourage, not so much in regard to short-distance flying between London and the continent, but more in respect to the establishment of long-distance routes connecting the home country with the Dominions. Here, in the Imperial air-mail, was seen a goal which it was in the interests of the whole Empire to foster. What a carefully planned subsidy scheme would do, it was realized, was to accelerate progress, to aid the airway in overcoming its early difficulties, and to quicken the coming of the day when regular trans-Empire flying was an accomplished fact. And while one is upon this subject it may be said—without anticipating what will be dealt with more fully later—that in their very moderate subsidizing of British aerial transport our authorities have already obtained excellent value for the money expended. Subsidies over a term of years have enabled our airways to embark upon constructive programmes of development, and have permitted technical plans to be evolved, which would have been impossible if air transport had continued to eke out a hand-to-mouth existence without any form of State assistance. Wisely-given subsidies have been described as a method of " buying the future ". The assistance of British air transport has enabled progress to be made, during a comparatively short period of years, which would have taken very considerably longer if Government help had been withheld. And, remembering that " transportation is civilization ", and that any acceleration of our communications is of universal benefit, the public as a whole stands to benefit, definitely, by an encouragement of the fastest of all methods of transport, that by way of the air.

The fruits of a more settled policy, so far as British air-mail progress was concerned, soon became apparent. Rapid progress was made in connection with the ground

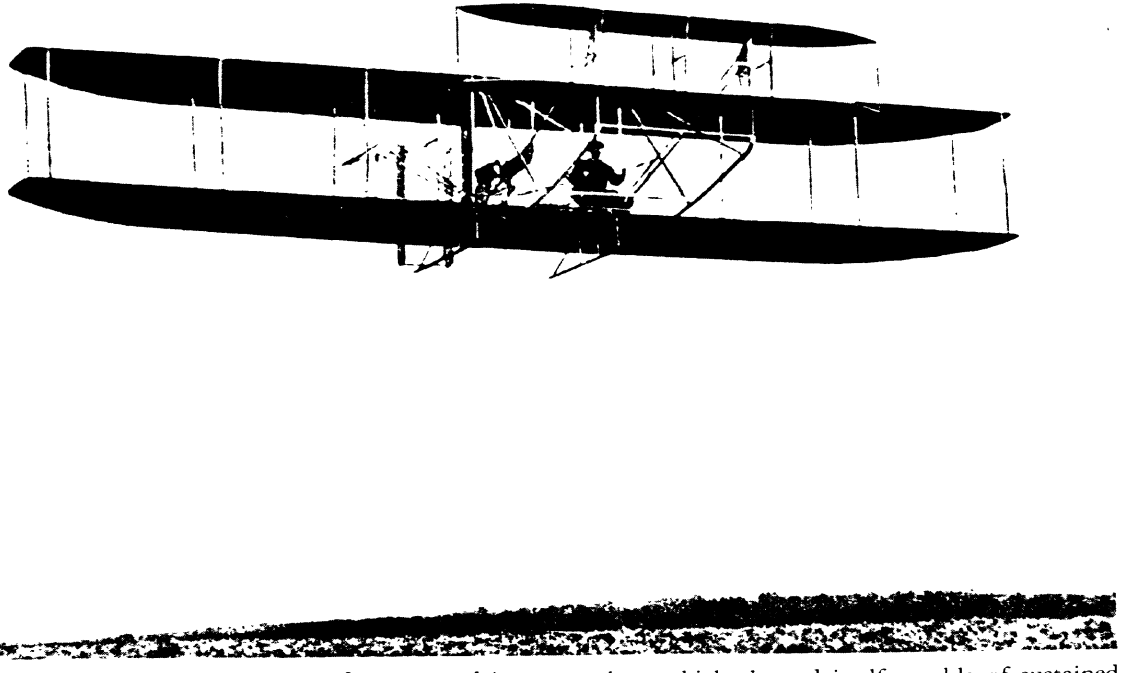
organization of the air-mail, and also in regard to the aircraft employed. Vital, both to safety and reliability, are the main and emergency alighting-grounds, the wireless signalling, the weather reporting services, and the guiding lights and aerodrome lighting which enable flights to be accomplished during the hours of darkness.

When air transport began, in 1919, this organization was non-existent. All that the operators of the pioneer services had at their disposal were a few hastily converted war machines and a band of enthusiastic pilots, ready to go anywhere or do anything. On a route like London-Paris, it is true, there was a rudimentary system of meteorology which, as a rule, gave pilots some idea of what conditions might be like when they came to fly over the route. But that was about all. The elaborate system we know to-day was still a thing of the future. Take, for example, the wireless telephone, which now plays so important a part in the maintenance of reliability on an airway, particularly when weather conditions are difficult. In those early days there was nothing of the kind. A pilot had just to fly off into the blue, taking it for granted that the aerodrome for which he was bound, probably several hundred miles away, would be clear of fog or mist, and be safe to alight on, when he found himself over it. There was then no means whatever, as there is to-day, of keeping him advised, while he was in the air, of weather changes taking place along the route ahead of him. And the importance of this point cannot be overestimated. On an air-line such as that between London and Paris, a pilot might start off in suitable weather from one terminal point, and might ascertain, by consulting a weather map before ascending, that the air station to which he was flying was also, at the moment, suitable from a weather viewpoint for a normal descent. But then while he was aloft, and

flying along the route, a sudden bank of mist or fog might come creeping over the air station for which he was bound, making a descent there fraught with difficulty and risk. And in early days, prior to the introduction of the wireless telephone, a pilot in such circumstances had to rely entirely on his own resources. When he saw that the air station which he was approaching was misty or fog-bound, he had to alter his plans quickly, and steer for some alternative station which might lie just outside the fog zone. Such a change of plans, however, and the extra flying it entailed, might mean that his petrol supply was perilously near coming to an end before he could find a suitable spot at which to alight. In any case, such a hit-or-miss state of affairs was extremely unsatisfactory, both to the pilot and to the airway organization. Every effort was therefore made to invoke the wonderful aid which wireless could afford, and to develop a practical system of wireless telephone signalling between aircraft in flight and ground stations.

Regular tests were soon in progress between an Air Ministry ground station and an operator flying in one or other of the twin-engined Handley Page biplanes on the London-Paris route. These experiments were continued systematically, difficulties and troubles being traced and overcome, and lightweight installations were evolved in due course which, it was found, could be made perfectly suitable for use in aircraft while in flight.

Improvements now became possible which had far-reaching results; and, going hand in hand with these wireless developments, our British authorities, in conjunction with air-ports on the continent, evolved a system of meteorology which enabled weather reports over a wide area to be obtained at frequent intervals, and to be flashed by wireless along the various routes, thus giving pilots all the information they required as to the



Wilbur Wright in flight in the first power-driven aeroplane which showed itself capable of sustained, controlled flight

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conditions they were likely to encounter when making their scheduled daily flights. In addition, also, to all the reports available at ground stations, the wireless telephone enabled the airway authorities to communicate, whenever required, with the pilots of machines in flight, warning them of sudden weather changes.

In this way the first stages were taken in creating an airway system which, stage by stage, was improved and developed until we reached the splendid organization which is in operation to-day, and which we shall describe more fully later. In the meantime, and before approaching any of the more modern phases of the aerial mail, it will be appropriate to describe some of the individual exploits of those pioneers who, by their skill and daring, paved the way for the great post-war era of transport by air.

CHAPTER IV

SOME PIONEER AERIAL POSTMEN

The first Atlantic flights—Crossing by the American flying-boats—Hawker's dramatic descent in mid-Atlantic—His sea-stained mails—First non-stop Atlantic crossing by Alcock and Brown—The return Atlantic voyage by the airship R34—Ross Smith and Keith Smith fly to Australia—The fascination of air-stamp collecting

THE progress which had been made during the war, not only with aircraft, but also with the art of piloting them, was revealed strikingly, in the immediate post-war period, by the boldness of the projects to which airmen devoted themselves. In the pre-war experiments in mail transport by air, as we have shown, only comparatively short-distance flights were attempted; but after the War, with the knowledge and experience it had provided, airmen were encouraged to plan flights which would have been considered utterly impossible in the phase just before the war.

The most daring and spectacular of the schemes with which pilots were busy, as soon as they could turn their energies from war to peace, was that for an aeroplane flight across the Atlantic. Plans in this regard were rendered all the more active seeing that the late Lord Northcliffe, in his constant desire to encourage air progress, had offered a prize of as much as £10,000 for the first non-stop Atlantic crossing by aeroplane. This prize had, as a matter of fact, been on offer before the war, and early in 1914, just before the outbreak of hostilities, two famous airmen had been working on

details of an attempt to win it. One of them was the late Gustav Hamel, whom we have already mentioned in connection with his experimental air-mail flying in 1911; while the other was Mr Claude Grahame-White, the pilot who had the distinction of carrying out the first air-mail flight in this country. Mr Hamel had plans for a fast machine which would drop its under-carriage, after ascending, in order to increase its speed; while Mr Grahame-White's scheme, to which he was putting finishing touches just as the war broke out, was for a big multi-engined marine-type aircraft—a machine which, had it been possible to construct it, would have been the first of the very large heavier-than-air craft. But neither Mr Grahame-White's scheme, nor that of Gustav Hamel, could be brought to anything like a definite issue. Mr Hamel, unfortunately, lost his life while flying a machine from France to take part in the Aerial Derby of 1914; while Mr Grahame-White, on the outbreak of war, had to turn his attention from sporting plans to work of a far grimmer character.

And so the Atlantic remained unconquered during all the years of war; but it was not long after that great conflict that aircraft were flying successfully above its mighty wastes.

In May, 1919, three American flying-boats, the NC1, the NC3, and the NC4, started on a west to east flight, in stages, from Newfoundland to Plymouth. The first section of their ocean passage was one of 1,380 miles to Horta in the Azores. Two of the boats, however, the NC1 and the NC3, were obliged to retire from the flight at an early stage, after having to make forced descents in fog; but the NC4, piloted by a very well-known and clever airman, Lieut-Commander Read, duly reached Horta on May 17th. Then, three days later, he flew a second stage of 190 miles to Ponta Delgada, and on the

27th left for Lisbon, accomplishing this section in a day. After which, on May 30th, the flying-boat went on another 340 miles to Ferrol, and on the following day succeeded in accomplishing the last trans-ocean stage of 420 miles to Plymouth.

The crew of the NC4, after thus turning a fresh page in aerial history, had a great reception on their arrival in this country.

It was at about this time that a famous British test-pilot, Mr Harry Hawker, was completing his plans for a project even more daring. The Americans made their trans-ocean flight in stages; but Mr Hawker, carrying a small bag of special mails, intended to effect the Atlantic flight, from Newfoundland to Ireland, without any intermediate landing, thus making a bid for the £10,000 prize offered by Lord Northcliffe, and which called for a direct, non-stop crossing.

It should be mentioned that there was a very good reason for electing to fly the Atlantic from west to east—that is to say, from Newfoundland to Ireland—rather than from east to west, ascending from Ireland and steering towards Newfoundland. And this reason lay in the general prevalence of a west-to-east wind current over the North Atlantic. The existence of such a trend, and the aid it might be relied upon to give, was a very important consideration when planning a non-stop Atlantic flight. In order to make such a flight anything like a practical proposition, the aircraft had to ascend with an immense fuel-load, and if head-winds were met with on the flight, as might be anticipated on an east-to-west crossing, there was a risk of the fuel supply becoming exhausted before the goal was reached—a decidedly unpleasant contingency when a vast expanse of water was being flown over. On the other hand, in making a west-to-east attempt, and in timing the start

so as to coincide with a strong favouring wind, the speed of the flight might be accelerated considerably, and a bigger margin ensured so far as the petrol supply was concerned. All such factors had been weighed carefully by Mr Hawker, who was an airman of very great experience, and who had decided to employ as his machine a powerful single-engined Sopwith 'plane, of a type which had been consistently successful on war service. Of course the navigation of an aeroplane, on such a long flight as this, became a matter of extreme importance, and Mr Hawker arranged to take with him in his machine Commander Mackenzie-Grieve, who had made a special study of the problems involved in keeping an accurate course while on a trans-ocean flight, far removed from any ordinary guiding landmarks.

All final details having been arranged, the Sopwith machine was shipped from England to St John's, Newfoundland, and from the Mount Pearl aerodrome there, at 6.48 p.m. one evening, the heavily loaded 'plane ascended, with its two occupants, on the first attempt to fly without alighting for 1,890 miles to the far-distant coast of Ireland. Just after ascending, in order to lessen wind resistance, and so increase the speed of his machine, Hawker operated a device which caused his alighting-gear to fall away, it being calculated that at the end of the flight, the aircraft having then used up its immense load of fuel, it would be possible to make a safe descent on the under-part of the fuselage.

After vanishing from the gaze of the watchers at St John's, these two air adventurers made good progress for a time, in spite of encountering fog and rain. They managed to keep an accurate course, and had flown a considerable distance when Hawker experienced some anxiety regarding his engine, which began to show signs of over-heating. This was due to radiator trouble

and, though the airman throttled back his engine so far as possible, the over-heating persisted to such an extent that he feared that before long they would be faced with the grim necessity of making a compulsory descent into the Atlantic. They had flown through the night since ascending from Newfoundland, and were now in daylight again over a stretch of water on which there was no sign of any ship, their position being roughly about 750 miles from the coast of Ireland. Hawker now realized, from the condition of his engine, that there was no possible chance of reaching land, and that the best they could hope for was to nurse the failing motor until they could find some vessel near which they could alight, and which would take them on board.

Now ensued a period of intense anxiety. The time-factor was insistent. No airman, however skilled, could hope to keep that motor running for more than a little while longer. And yet, strain their eyes though they might, they could see no sign of any ship on the surface of the ocean below. During their flight they had kept accurately to their course, and knew that they were in the vicinity of the Atlantic steamer track; and in order to aid their search Hawker now began to steer a zig-zag path to and fro above this ocean track, thus hoping against hope that a glimpse of some surface craft would solve their problem for them just in the nick of time. But Fate seemed against them that day. Flying to and fro, with their motor nearer and nearer the moment when over-heating must cause it to fail, they still saw nothing but an empty, desolate ocean stretching beneath. Not a vessel, not a smoke-trail, rewarded the anxious glances which they cast here and there. Matters were now nearing a crisis, and the occupants of the machine were beginning to resign themselves to the worst when, through an opening in a patch of low-lying cloud, they

saw a sight which, for the moment, seemed almost too good to be true. It was a small steamer, the "Mary", ploughing a lonely way through the Atlantic swell!

Never could any sight have been more welcome. Both Hawker and Mackenzie-Grieve, as they said afterwards, felt that searching for a steamer, with that failing motor of theirs, was like looking for a needle in a bottle of hay. The ocean seemed so vast, and the chance of any help so slender. But now here lay salvation close at hand. Down through the clouds Hawker steered their craft—down till they were circling round that little surface craft. And a surprised man its captain was, to see an aeroplane suddenly wheel towards him, from the clouds, out there in mid-Atlantic. But there was little time, now, for anything save swift action. Hawker flew round and round the steamer, getting closer each time, and indicating to those on board, by his gestures, that he intended to alight on the water close by, in order that they could pick him up. And the need for prompt action was all the more insistent owing to the fact that the sea was now getting rough, and that it would be no easy matter for the steamer to launch a boat and bring off the aeroplane's crew.

Down into the rising waves, with all the judgment he could command, Hawker piloted his machine, being careful not to risk any such descent as might cause the craft to dive beneath the surface. A perfect alighting, under the circumstances, he actually managed to contrive, and there the aircraft floated, rising and falling with the waves, while the crew of the "Mary", working with feverish haste, got out a boat and rowed across the short distance dividing them from the stranded 'plane. Smartly the necessary movements were made, and Hawker and Mackenzie-Grieve abandoned their 'plane and were taken across to the little steamer which was

standing by to receive them; and that rescue had been accomplished only just in the nick of time, because the sea continued to rise, and soon became so rough that it would have been impossible for a boat to have been launched.

There was no chance, of course, for a small vessel like the "Mary" to salve the stranded 'plane. It just had to be left drifting on the water; and so quickly had the two airmen been obliged to abandon it, at the last moment, that they had no time to take with them, into the "Mary's" boat, the bag of special mails which they had intended should be the first letters air-borne above the Atlantic in a non-stop flight. The history of that abandoned mail-bag formed one of the romances of this dramatic story. Contrary to all expectations, the derelict 'plane did not sink or break up after the "Mary" had steamed away from it. The sea abated, and the aeroplane drifted about in the Atlantic for several days, being sighted ultimately by a passing vessel, which succeeded in salving the mail bag from the fuselage of the 'plane. Some of the letters in the bag had suffered from their immersion, and bore sea-stains which, from the point of view of the collectors who afterwards competed to obtain specimens, enhanced their value as historical relics. At first, soon after the flight, it was possible to buy one of those sea-soaked letters for not more than £15; but recently the price of a single cover had gone up to as much as £200; while at the present time, should one come into the market, it is reckoned that it would fetch £280, and perhaps even more.

As a matter of fact, the mid-Atlantic rescue of Hawker and Mackenzie-Grieve did not exhaust the dramatic aspect of this remarkable flight—one of the most memorable in aerial history. Far from it. That little steamer,



Mr Grahame-White, the famous British airman, loading letters into the bag which he carried for seven miles by air in 1910, this being the first air-mail experiment in England

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the " Mary ", had no wireless, and it was not until five days later, approaching a coastal station, that she was able to signal the fact that she had on board the two rescued airmen. And in the meantime, naturally, there having been nothing but silence after their departure from the Newfoundland coast, there was a tendency to fear the worst. There was one, however, who refused to have her confidence shaken, and that was Hawker's wife. Though she was receiving messages of condolence, as the days went by, she continued to insist that news would come through, sooner or later, to say that her husband and Mackenzie-Grieve were rescued. And, in the end, her faith was fully justified. Not only England, but the world, was electrified when the laconic news was signalled from that little steamer, and when Hawker and Mackenzie-Grieve arrived in London they had a reception from the public which was tumultuous. Enormous crowds assembled in the streets, and as the airmen made their way to the Royal Aero Club, their progress was in the nature of a triumphal procession. Hawker, in fact, to escape temporarily from the crowds pressing round him, had to be mounted upon a policeman's horse.

The gallant failure of Hawker and Mackenzie-Grieve left the £10,000 trans-Atlantic prize still to be won, although other well-known champions were in the field. Raynham, another British airman, was a competitor with his Martinsyde 'plane; but he met with a mishap when endeavouring to take off at Newfoundland with his heavily-loaded machine, and was put out of the running at the very start. Two other entrants for the prize were Capt. John Alcock and Lieut. Whitten-Brown, the former a well-known and popular British pilot, and the latter an expert on every aspect of aerial navigation. They had chosen as their 'plane a big twin-engined

Vickers-Vimy machine of the type used extensively as a bomber during the war. Arriving with their machine at St John's, Newfoundland, on May 24th, 1919, they made a trial flight on June 9th. Then however, like others, they had to wait for suitable weather conditions, and it was not until 4.28 p.m. on the afternoon of June 14th that they took off from St John's on their non-stop Atlantic attempt, aided by a favouring wind which sent them on the first stages of their great adventure at 100 miles an hour.

But that enemy of the airman who flies the Atlantic by a northerly route, fog, soon made itself apparent. They climbed as high as they could in their heavily-laden 'plane, and soon lost all sight of the sea beneath. Then great masses of cloud began to trouble them. They rose above one bank, only to find another just above. For a time the biplane sped along through a sort of corridor in the clouds, with great layers of cloud above and below. And then the banks drew together, and the aeroplane became immersed in a huge sea of cloud from which, for a while, there was no escape. And it was at about this time that the airmen had one of the most terrible experiences that any flying men have ever endured. Buffeted by wind-eddies while flying through the clouds, Alcock found it a matter of extreme difficulty to keep their big machine under control. It was tossed here and there until, for a spell, the pilot found that it had got completely out of hand. Developing a side-slip from which Alcock, with all his skill, could not for the moment extricate it, the biplane started to spin down through the clouds towards the surface of the Atlantic far below. With no horizon-line to aid him, and with nothing but the dark masses of cloud all around, the pilot found himself in a desperate position.

Down through the clouds, now utterly out of control, the aircraft span, threatening to dive pell-mell into the waves of the Atlantic, with consequences which would have meant death, and nothing less, for the two occupants of the machine. Alcock struggled heroically at the controls; but for the moment all seemed lost. Then, when not more than a few hundred feet above the surface of the ocean, the machine shot out from the clouds into clear air. Alcock, directly he could see the surface of the water, was able to judge the altitude and inclination of his machine, and found that they were almost upside-down, and in a situation so perilous that it seemed that nothing could save them. Alcock, however, was not only a magnificent pilot, but also a man of iron nerve. Never for an instant losing his presence of mind, he handled that falling 'plane so superbly that, just before it was about to strike the surface of the water, he managed to check the spin, bringing the big craft back once more on to an even keel with the waves of the Atlantic only a few feet beneath them. After which, climbing again to restore altitude, they continued their battle against the elements with unabated courage. Whitten-Brown, the navigator, managed to check their position by his observations, and aided as they were by a following wind, it was found that they were making rapid progress towards Ireland. The two engines of the machine kept running splendidly and, though the airmen found themselves for a time in a layer of intense cold, and also had to contend with tremendous "bumps" which threw the 'plane about alarmingly, they kept doggedly on, feeling that if no mechanical trouble befell them they might now hope to win through to their goal. So the hours sped by until, at length, there was the welcome sight of land ahead, and they sighted the wireless station at Clifden, Ireland. On passing over the Irish coast

they picked out what looked like a suitable field in which to alight, but it proved to be boggy, and the machine, after touching ground, went forward on to its nose. Neither of the airmen, however, was hurt, and so was accomplished the first direct non-stop Atlantic aeroplane flight—one of the finest of all feats in aerial history. Actually the flight from Newfoundland to Ireland had been effected in 16 hours 27 minutes, at a speed as high as 117 miles an hour.

In addition to winning the £10,000 prize the airmen received well-deserved knighthoods for their splendid achievement. There was much competition, also, to obtain as souvenirs the limited number of letters which they had carried with them on their ocean flight. To-day such flown covers, telling as they do the story of this heroic Alcock and Brown flight, are much-prized features in the albums of collectors, each such letter being, at the present time, worth approximately £50. Many trans-Atlantic flights have been accomplished since those early days, but none of them have been finer, as examples of airmanship and courage, than that pioneer non-stop dash of Alcock and Brown. It was a magnificent feat of pilotage; a superb piece of navigation; and an example, also, of the splendid quality and workmanship of British aircraft and aero-engines.

Nor did that aeroplane triumph represent the limit of British achievement in this new field of trans-ocean flight, because in that same year of 1919 our Government airship R34 carrying thirty people on board, not only flew the Atlantic from England to America, but also succeeded in accomplishing a return flight, carrying with her on this return trip a special mail-bag, the letters contained in which are now sought eagerly by collectors being worth at the present time something like £35 apiece.

Fitted with extra fuel-tanks, which gave her an ability to carry eight tons of petrol, the R34 which was in command of the late Major G. H. Scott, ascended from East Fortune on her outward flight to America on June 2nd, 1919. Among those on board the airship were—First Officer, Capt. G. H. Greenland, Second Officer, Lieut. H. T. Luck, and Engineer-Officer, Lieut. J. D. Shotter; while Brigadier-General Maitland represented the Air Ministry. On the first stage of her outward flight, from East Fortune to Trinity Bay, Newfoundland, the airship's progress was comparatively easy. There was a good service of meals on board, and in leisure moments the crew listened to the strains of a gramophone, while General Maitland was engaged in the task of writing a description of the airship's voyage. On beyond Trinity Bay, however, storms and severe electrical disturbances were encountered. The course had to be altered, which meant considerable detours and, as a consequence, the airship's petrol began to run short; a state of affairs which was rendered all the more difficult owing to the prevalence of head-winds. Soon, in fact, the position was considered so serious, from a petrol shortage point of view, that wireless signals were sent out from the R34 asking for destroyers to stand by in case she might need towing. As a matter of fact, however, the airship managed to struggle on without assistance and, under her own power, duly reached Mineola Field, Long Island, New York, at 9.55 a.m. on July 6th, having accomplished her outward trans-ocean crossing in 108 hours 12 minutes.

At that time there was no shed in America capable of accommodating the R34, and so she had to be moored out in the open at Mineola while she was being re-fuelled with petrol for her return flight to England. She remained moored at Mineola until midnight on July 9th.

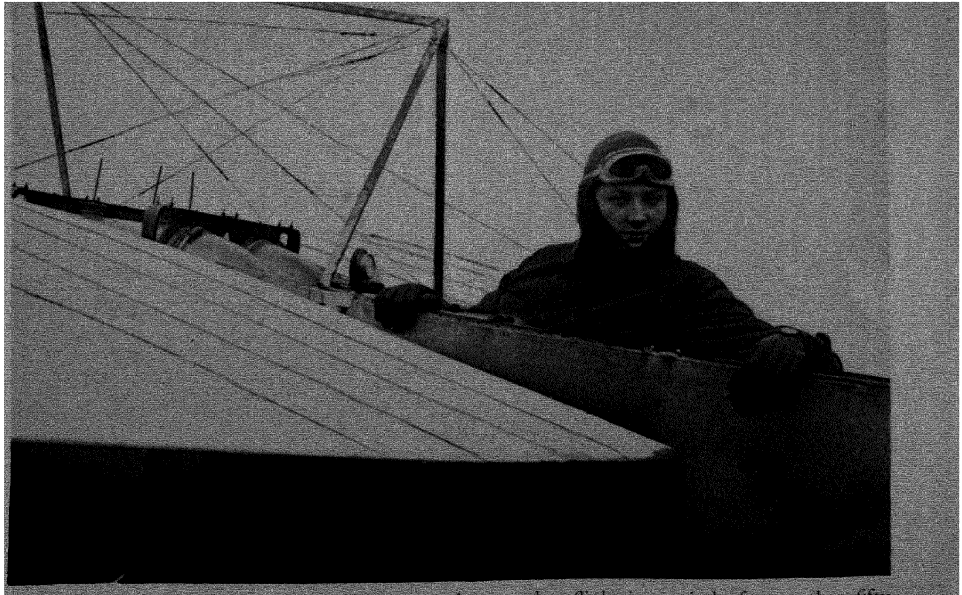
Then, however, warnings were received from the meteorological experts of a serious storm which was approaching. And so Major Scott decided to hasten his departure. The airship, having cast off from her moorings, flew over New York City in the glare of many searchlights, and then set out on her return flight across the ocean. On this homeward voyage the R34 was aided greatly by the prevailing winds which blew from west to east above the Atlantic; and, as a consequence, she made the return trip in 75 hours 3 minutes, reaching the Pulham airship station, Norfolk, at 7.57 a.m. on July 13th.

As already mentioned, the R34 carried mails with her on this trip home from America, and the flight was heralded as being a very striking illustration of the possibilities of rapid mail transport by big ocean-going airships. Unfortunately, however, the subsequent history of airships has been marred by disaster—although, at the same time, many fine flights have been accomplished, more especially by that genius in the navigation of airships, Dr Eckener. It is not our purpose, here, to dwell specially upon this problem of big lighter-than-air craft, our narrative dealing more with the network of mail routes operated by aeroplane and flying-boat. But, at the same time, the occasion may be taken to outline, briefly, some of the problems which confront designers of very big airships which are intended for commercial operation on long-distance mail routes.

One needs, just to start with, to consider the ocean of the air in which the big dirigible has to be navigated. The designer is confronted not only with the question of normal, horizontal air movements, the winds with which we are familiar at ground level, but also with the existence, sometimes, of a far more difficult problem as represented by abnormal, vertical movements of the atmosphere. Under certain conditions, in fact, and

most particularly in the vicinity of electrical storms, flying machines have to contend with powerful vertical air-currents, which may be moving up or down. From the view-point of the structural strains imposed on large airships, the existence of such vertical air-currents represents a very serious problem ; and, though intricate calculations have been made as to the stresses they are likely to impose, more than one airship disaster has been attributed to them. They are capable of exercising violent twisting strains upon a dirigible's hull. The bow of a big machine may, for example, become involved in one of them, while the stern remains in a more normal current. Under such conditions it is not difficult to imagine the immense stresses to which any essentially lightweight structure may be subjected. Looking at the matter from a purely commercial or mail-carrying point of view, as we are doing here, the designers of large airships may be said to be between the devil and the deep sea. It is quite possible for them, of course, to impart a greater and greater strength to hull structures, so as to embody factors resisting the known or more or less unknown strains of abnormal atmospheric movements. But what they have always to remember is that their machines must be practicable transport vehicles. They must, that is to say, over and above their own weight and that of their fuel and crew, carry an adequate paying load. If they do not do so they cannot be operated with commercial success. Thus a balance must always be struck between the weight which gives strength and the lightness which enables a maximum of useful load to be carried. Advocates of the big airship, when disasters lead to demands that work in this field should be abandoned, argue that owing to its great cost lighter-than-air construction is still in its infancy, and that more time should be allowed before big dirigibles are con-

demned. It is claimed that the problem of the opposing claims of structural strength and paying load can be solved, granted that further experience is obtained in large-scale construction. But there are others who argue—and they make out a formidable case—that the fundamental difficulties in constructing a huge feather-weight framework such as that of a giant airship, assuming always that the weight-factors are kept down to reasonable commercial requirements, render it impossible for such a huge machine to survive without damage the onslaught of such tempests as are encountered sometimes in trans-ocean journeys. It is claimed, in fact, that the designers of giant airships are pursuing a will o' the wisp, and that bearing in mind the wonderful advances now being made in the construction of big, staunch, multi-engined flying-boats, it would be a far better policy to concentrate on all-weather heavier-than-air craft rather than to fritter away further large sums of money, and perhaps risk many more valuable lives, in an endeavour to overcome the inherent frailness of the lighter-than-air principle. There, at the moment, the matter may be said to rest. In a good many directions, plans for great airships have, since the disaster to the "Akron", been abandoned. In other quarters, however, experimental work continues, there being an enthusiastic body of airship men who refuse to let disaster daunt them. At the same time, as had been proved on many important mail-carrying routes, the multi-engined flying-boat can be operated in all weathers with remarkable factors of safety and reliability, and very big ocean-going flying-boats are in construction to-day, ready for the institution of regular air-mail routes above the Atlantic. Their advocates declare that, in due course, the marine-type heavier-than-air craft will give us all we want in the way of long-range machines,



The late Gustav Hamel who, in his Blériot monoplane, made a flight in a wind of more than fifty miles an hour during the first officially-recognized air-mail experiment in England, in 1911

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and will prove a better proposition, commercially, than any service operated by huge and costly dirigibles. Yet even so, and with such practical evidence in favour of the heavier-than-air principle, the airship school still asks us to wait, before pronouncing our verdict, until they can produce a perfected craft more near to the ideals they have in view. Here, however, the matter is largely one of finance, and also of public confidence. At the moment of writing, at any rate, the airship is under such a cloud, as a result of the "Akron" catastrophe, that its entire future appears jeopardized. Confidence has been shaken. The problem of obtaining capital for big schemes has been rendered infinitely more difficult, and there are those who do not hesitate to say, now, that the doom of the big airship is already sealed. And yet such a great pioneer as Dr Eckener refuses to lose faith, while both in Germany and the United States work with big dirigibles persists. This being so, it appears that time alone can answer a problem concerning which so many different views are expressed. Books might be, and have been, written for and against, but here in this particular volume it has been our purpose merely to touch upon the question in passing, and, having thus outlined matters briefly, we can now resume our general narrative.

Hitherto, in this chapter, we have been dealing with the pioneer post-war flights of the first aerial conquerors of the Atlantic. But there was another heroic achievement during this phase in which the airmen, after ascending from England, flew eastward in stages for 10,000 miles, effecting the first journey by aeroplane between the home country and far Australia. As an encouragement to such an effort, the Australian Government had offered a prize of £10,000 for a pioneer England-Australia flight, a condition being that the machine employed

should be all-British, and that the aerial journey should be accomplished in 720 consecutive hours. Entering the lists for this prize were the airmen Ross-Smith and Keith-Smith, and they chose as their craft a twin-engined Vickers-Vimy biplane of the same type as Alcock and Brown had used on their successful Atlantic flight. It was on November 12th, 1919, that the airmen left the Hounslow Aerodrome, near London, en route for Australia, and after many adventures they arrived at Port Darwin on December 10th, having completed the flight in 27 days 20 hours 20 minutes, and having 51 hours 40 minutes to spare out of the specified 720 hours.

One of the thrills of this fine achievement occurred when the airmen alighted at Surabaya, in Java, their goal nearly reached. The landing-ground here proved so muddy, and the wheels of the big biplane sank so deeply into this mud, that it seemed for a time as though it would be impossible to get into the air again, and that the airmen would be robbed of victory when it was almost in sight. It was here, though, that Ross-Smith and Keith-Smith showed that resourcefulness which they had exhibited time and again during their flight. With bamboo mats commandeered from houses, and with anything else they could lay their hands on, they managed to make a runway through the mud. The first attempt to use it failed; but, nothing daunted, the airmen tried again, and this time just succeeded in getting their machine "unstuck".

The airmen carried a bag of special mails with them on this magnificent "blazing-the-trail" flight. The letters so carried, when they reached Australia, had commemorative stamps attached to them; and to-day for one of these letters, collectors are willing to pay £40.

Many another air-mail cover is sought by ardent collectors nowadays. Not only is air-stamp collecting

a delightful and engrossing hobby, with good stamps always increasing in value, but a really fine collection, with all its fascinating exhibits, tells in itself, pictorially, the story of the aerial conquest. Those who are experts can tell you remarkable things about air-stamp collecting nowadays. It is a hobby which is becoming one of the most fascinatin in the world. And one of the strangest of all histories attaches to that air-stamp which owes its value to a mistake in printing, and which is now, in price, soaring towards the £1,000 mark. It was in 1918, in a stamp issue in the United States, that a small picture of a flying machine figured as the centre of the design. This aeroplane, by an error not discovered until a number of the stamps had actually been issued, was printed upside down; and it is this limited issue of the inverted stamp—just such an oddity as collectors seek—which has become so valuable. At one time a specimen could be bought for about £150. Before long, however, the price soared to £500, and from this to £700; while at the present time, should a fine copy be offered for sale, experts would not be surprised if it fetched £1,000.

CHAPTER V

STORIES OF THE FIRST AIR-MAIL SERVICES

"Bolsons" in the Channel—Some amusing episodes—The epic flight by Lieut. Shaw—The establishment of Imperial Airways—Mail-plane development summarized—The first specially-designed commercial aircraft—The multi-engine principle—Problems of bad-weather flying—Combating fog

IN our previous chapter we dealt with some of those outstanding flights of the pioneer post-war era—flights in which aerial trails were blazed, and on which the airmen carried bags of special mails, the contents of which are now so eagerly prized by the growing army of air-post collectors. And now in this chapter, carrying our story a stage farther, we shall tell some tales of the airmen who flew on the first regular air-mail services—tales of those days in which commercial flying was not so well organized as it is to-day, and when adventures were more common than they are at the present time. As a matter of fact to-day's air-mail pilot, with his multi-engined machine and wonderful ground organization, laughs at the idea that there is anything adventurous about his calling; in proof of which one may quote the remark of one of them only the other day. On descending from a routine flight he was asked whether he had met with any unusual experiences on his aerial journey. Whereupon, he turned to his questioner, with the words:

"Would you go up to the driver of the Scotch express and ask him whether he had met with any adventures on one of his routine runs? Of course you

wouldn't. Well then, why ask me? A trip on the air express is, I can assure you, just as much a matter of routine, to-day, as is the scheduled run of an express train."

Such was not the case, however, in early days, when lessons were being learned and the general equipment of the aerial mail was more or less experimental. Some amusing stories are, as a matter of fact, told of those pioneer days, just over fourteen years ago now, when a little band of expert airmen were flying on our first civil air routes between London and the continent. Picked from among the finest of our war-time pilots, these first flying postmen were determined, come what may, to show the world that the airway was a practicable means of high-speed transport: hence no weather, save the very worst, deterred them from their scheduled flights.

From the other side of the Channel, before they set off on their flights from London, it was the custom to receive wireless weather reports; but the organization in this regard was, in those days, decidedly sketchy, and sometimes the messages which came through, owing to "atmospherics" and other troubles, made rather curious reading.

One morning, for example, when he arrived at Hounslow to fly the scheduled 'plane to Paris, and on asking to see the latest weather report from the other side, the pilot of the air-mail saw a grin on the face of the official who brought forward the necessary document.

"What's the joke?" asked the pilot.

"Well," was the answer, "I'm sorry to tell you, old man, that you look like having a rather sticky time of it over the Channel to-day."

"Why?" queried the pilot, some anxiety creeping into his voice.

" According to this message," replied the official, striving to impart a note of gravity into his tones, " there are ' bolsons ' up in the air above the Channel."

The pilot, completely puzzled, snatched the message from him. There, sure enough, was this mysterious reference to " bolsons ", mingled with the usual Channel weather data as to wind strengths and cloud.

" ' Bolsons ' ! " exclaimed the pilot, irritably. " What on earth can they mean ? I never heard of such a thing. It must be a mistake in transmission. Of course you've queried them ? "

" Certainly," replied the official. " As a matter of fact we've done so twice, and each time it's come over again as ' bolsons '. They won't have it that there is any mistake. This being so "—and here the official could not help smiling again—" I'm afraid you'll have to do the best you can, old man. If you do meet one of these things, whatever they are, perhaps you'll be able to fly over, under, or round it, or something of that sort."

The pilot saw the joke now, and grinned back as he clambered into his cockpit.

" After some of the anti-aircraft stuff that we had to fly through in the war," he said, " I don't think I shall get the wind up much if I do meet an odd ' bolson ' or two."

And with that he was off, completing his flight to schedule, and being disappointed, as he said on alighting at Paris, not to have discerned, when above mid-Channel, anything that looked remotely like a " bolson ".

There this particular joke rested, because the mystery of that strange reference to " bolsons " in the foreign weather reports was never solved. Nobody ever knew how the word originated. Nobody had the remotest idea what a " bolson " was ; and no pilot on the cross-Channel routes ever reported any unusual phenomenon.

Of course the most likely explanation of the whole thing was that it was an error in transmission in which, for some reason best known to himself, the operator on the other side persisted even after queries had been sent through to him. In any case, whatever the explanation might have been, it certainly caused some amusement, that day, on the London-Paris air-mail.

Queer tricks, indeed, the wireless used to play in those pioneer days, when the whole system of transmission was far less perfect than it is at the present time. One afternoon, for example, cross-Channel pilots were warned in a message from the other side that conditions over the Channel were likely to become "squoggy". But by now the airmen were getting used to such verbal eccentricities in their weather reports, and beyond expressing some pardonable curiosity as to what an area of "squoggy" weather might be like, assuming one happened to encounter it, they just took off and flew as usual. And, though they kept a look out for anything unusual which might possibly come under the heading of "squoggy", nothing at all out of the way occurred. As a matter of fact, so far as that little band of pioneer air-mail pilots was concerned, it took something very bad indeed to make them abandon one of their scheduled flights.

In proof of which it is appropriate to tell a story which is still a classic in the annals of the aerial mail. It was during the first phase of the air service between London and Paris, and there came, one day, a spell of simply terrible weather from a flying point of view. In London it poured with rain, and the wind rose until it was blowing at gale force; while, to make matters worse for the flying postmen, there were driving squalls, with low, scurrying clouds, which made visibility extraordinarily bad. At Hounslow, then the London

air-port, the air-mail for Paris stood waiting to start to its schedule at noon; and in spite of the extremely bad weather, which threatened to grow worse, the pilot of the machine was eager to get away. He was not even deterred when the official weather report came through, describing conditions as "impossible". But the officials controlling the aerodrome, after waiting until the last moment, and after a final study of reports from various points, were obliged very reluctantly to give orders for the abandonment of the flight.

Hardly had these instructions been given effect to, and the aircraft wheeled back to its shed, when the authorities in London were astonished to receive a wireless message from the Paris air-port at Le Bourget, saying that the mail-plane due to leave there for London at noon had actually ascended in spite of the weather, being piloted by Lieut. H. Shaw, an airman who was a skilled test-pilot as well as one of the flyers of the aerial mail. It was learned afterwards that there had been some temporary improvement in conditions in Paris, just about the time the aircraft was scheduled to start; whereupon, without hesitation, Lieut. Shaw had shot off and vanished among the racing clouds, carrying in the small cabin of his machine two passengers who were in urgent haste to reach London. And what followed after that was a real-life drama of the air, which those who were associated with it are never likely to forget. For that brief improvement in the weather had been no more than temporary, and the farther the pilot flew after leaving Le Bourget, the worse the conditions actually became. But so far as the airman was concerned he had, one might say, burned his boats, because to turn back was almost out of the question, even had he thought of doing so, while the visibility grew so bad as he flew on towards the French coast, that any attempt at an



The late Sir John Alcock (the central figure) holding the bag of mails which he carried with him in his biplane, from Newfoundland to Ireland, in the first non-stop trans-Atlantic flight. On the right is his navigator, Sir Arthur Whitten-Brown, while standing on the left is Mr. Harry Hawker, hero of a dramatic descent in mid-Atlantic

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intermediate landing would have been fraught with the gravest peril. It was a case, as Lieut. Shaw himself said afterwards, of just being up in the air and staying there—a case of do or die!

When the time came for that wind-tossed mail-plane to speed out from the French shore for the aerial crossing of the Channel to England, the official wind strength readings, at 2,000 feet above the coast line, showed that super-gusts were now blowing with a velocity of 100 miles an hour, and even a fraction more. It seemed, in fact, as though it would be impossible for any aircraft to survive such conditions, and the officials in London waited for news with an anxiety which grew from moment to moment. But up there high in the storm-driven air, working ceaselessly at his controls, limbs aching, eyes strained through peering ahead, Lieut. Shaw fought his way across the Channel and appeared dramatically, his 'plane like an elusive shadow, just above the British coastal station at Lympne. Promptly this news was flashed through to London, and then there came another wait.

Inland on the English side, from the coast up to London, conditions grew even more terrible than they had been on the Channel crossing. Rain-charged clouds forced Lieut. Shaw to fly lower and lower as he groped his way onward. Up he flew through a rain-swept valley, being now so low, as he told us afterwards, that he could see the dim shadows of rising ground higher than his wings on either side of him. But still he battled his way grimly on, his powerful engine continuing to run without a falter; and at last Hounslow was reached, and that storm-beaten 'plane glided down from beneath a driving pall of cloud. Exhausted, the pilot clambered stiffly from his seat, and those of us who were waiting on the 'drome hastened to assist from the

tiny saloon those two passengers who, from their windows, had sat watching that drama of the wind-swept sky. All of us thought, naturally, that they would be nerve-shaken by such an ordeal. On the contrary, however, they declared that they had been thrilled by an experience which they said they would not have missed for anything.

"Glorious! Superb!"

Such were the words they used in describing what they had seen of that struggle with the gale, and their praises for Lieut. Shaw knew no bounds.

A great deal of early air-mail flying, as between London and the continent, was accomplished in single-engined craft of the type used by Lieut. Shaw in this epoch-making flight. They had been adapted very successfully from military to civil purposes. Their motors gave wonderful service, and forced landings were rare; but there was at the same time always the risk that, should such single-engined power plants give trouble while aloft, an airman would have to alight immediately, picking the best landing-ground he could. Having thus to rely upon single-engined power plants was not, in the view of British air transport experts, conducive to that high factor of reliability which was considered essential in all-the-year-round commercial air services; and so it became the trend of our British policy to develop the multi-engined mail-plane—a machine with two, three, or four engines, capable of maintaining itself in flight even in the unlikely event of its suffering any partial breakdown of its power plant. Before, however, one deals with this important aspect of air-mail progress, it is necessary to outline one of the chief events which influenced the comparatively early development of British air transport policy. We have already mentioned the crisis which led to a subsidy scheme for British civil aviation.

Following this, there was a phase in which several British companies developed routes. Before long, however, in the continued face of strong foreign competition, it was thought desirable that our British air efforts should be focussed into a single spear-head of effort. And it was decided to effect this purpose by the formation of a national, State-aided company, intended not only to operate between London and the continent, but also to develop long-distance routes stretching away from England across the Empire. Prolonged negotiations were required, however, before various interests were welded into a smooth-working scheme, in which the then existing British companies agreed to sink their separate identities in the national air transport enterprise of Imperial Airways Ltd. It was in 1924 that Imperial Airways came into existence, with Sir Eric Geddes as chairman of its board of directors. Having a clear policy of expansion, and with its assistance from the authorities definitely specified, the Company was able to unfold plans which soon bore effective fruit.

One of the most important questions, naturally, concerned the aircraft with which the Company was operating—the actual flying stock of the aerial mail. Here, to begin with, Imperial Airways were faced by the necessity of taking over, from the previous companies, a miscellaneous fleet of some fifteen aircraft representing different powers, capacities, and types, and it was the policy of the Company, as speedily as might be, to replace this mixture of flying craft by a fleet more likely to solve the problem of operating commercial aircraft on a really business scale. In this connection, so as to present a convenient summary of the position as it developed, it would probably be most suitable for us to sketch briefly the general trend of progress in respect of the mail-planes used on our British routes.

In the earliest phase, fourteen years ago now, the pioneer services had, as we have already indicated, to rely upon war-craft converted to commercial purposes. In this regard a well known machine was the De Havilland 4 a, a commercial edition of that famous D.H. 4 machine which did such yeoman service during the war. This D.H. 4, fitted with a small cabin behind the pilot for the accommodation of passengers, had in fact been used during the latter stages of the war by the R.A.F. Communication Squadron which had the task of flying statesmen and war leaders on their urgent journeys to and from the continent; and it was actually such a machine, flown by an R.A.F. pilot, which brought over from Paris the news of the signing of the Peace Treaty. After which, in the institution of the daily London-Paris commercial service, the D.H. 4a did admirable service, for a considerable period, in the aerial transport between the two capitals of passengers, mails, and freight. One may mention, incidentally, that it cost, in those days, as much as 20 guineas to make a flight in one of these machines from London to Paris, and such a flight, then, was something in the nature of an adventure, compared with the smooth luxury of a flight to Paris to-day. Well do airway pioneers remember the primitive nature of our organization of those early days. The station itself was represented by just one or two hastily converted war-time sheds, while all other facilities were of an equally sketchy character. And the intrepid passengers, when they arrived, had to be inserted into a tiny cabin and a sort of metal "lid" shut down upon them. After which, owing to the proximity of the big engine, they endured on their flight such a din that it was practically impossible for them to hear themselves speak, and the favourite method of communication was by means of scribbled sentences passed from hand to hand on scraps of paper.

A little hatchway provided communication between the passengers in their tiny cabin and the pilot out forward in his cockpit, and it was the habit for hastily-written messages to be passed to and fro during the progress of a flight. On one of the early journeys from London to Paris the machine flew into some very nasty weather; but the two passengers were determined to make the best of it, and thought it would be a good idea to pass a little reassuring message through to their pilot. So they wrote the question: "How are you going on? We're both fine in here!" At which the pilot, battling with cross-Channel weather at its worst, thrust through an answering missive which observed, laconically: "It's a hell of a time I'm having!" But he won through to Paris all the same, being one of that little band of commercial air pioneers who established so splendidly the traditions which are being followed by the growing army of air-mail pilots of to-day.

Driven by a 355 h.p. Rolls-Royce engine, the D.H. 4a carried its pilot and two passengers at a cruising speed of about 95 miles an hour, and it had a total pay-load of about 400 lb. Another famous mail-plane of those early days, which shared with the D.H. 4a the distinction of being employed extensively on our pioneer British air routes, was the Handley Page 0.400, a commercial edition of that war-time bomber, the name of which was so familiar to the public. At one time, in fact, it appeared almost as though all flying machines, so far as ordinary folk were concerned, were Handley Pages, because whenever an aeroplane of any kind appeared in the sky people would look up and say: "There goes a Handley Page!" The Handley Page 0.400 machine, which was driven by two 355 h.p. Rolls-Royce motors, had its big cabin equipped for passenger carrying, and cruised at a speed of 80 miles an hour, its load capacity being

represented by a crew of two and 2,500 lb. of passengers, mails, and freight. It was in these 0.400 machines that so many passengers had their baptism of the air on the cross-Channel routes, and it was in them, too, while they were flying between London and Paris, that the preliminary test work was accomplished which led to the general adoption of the wireless telephone on the airways.

In the meantime, while these war-time 'planes were serving their purpose on our aerial routes, designers were busy on the production of aircraft which were intended solely for civil use, and which embodied all the knowledge gained, up to that time, in the evolution of heavier-than-air flying machines. There is obviously a radical difference between the design of aircraft intended for war and those meant solely for civil use. In the design of civil aircraft, there is, for example, the question of what may be called their " payability " ; their capacity not only to carry commercial loads, but to do so on a remunerative basis. In the production of war-craft designers had gone out to obtain certain results quickly, and had succeeded in obtaining them, using engine-power lavishly, and not having to regard their problem from anything like a commercial viewpoint. If speed was wanted, then speed must be got, even though it entailed a heavy price in the shape of power expended. And so on in other respects. Results were needed, under the urgent demands of war, and they had to be secured without delay. But in air-mail transport, under commercial conditions, one has to view one's problem from many different angles. It is not, for example, just a question of speed and speed alone. Commercial aeroplanes can be made to fly extremely fast. There is no difficulty about that. But what they must also do, while attaining reasonably high speeds, is to carry an adequate

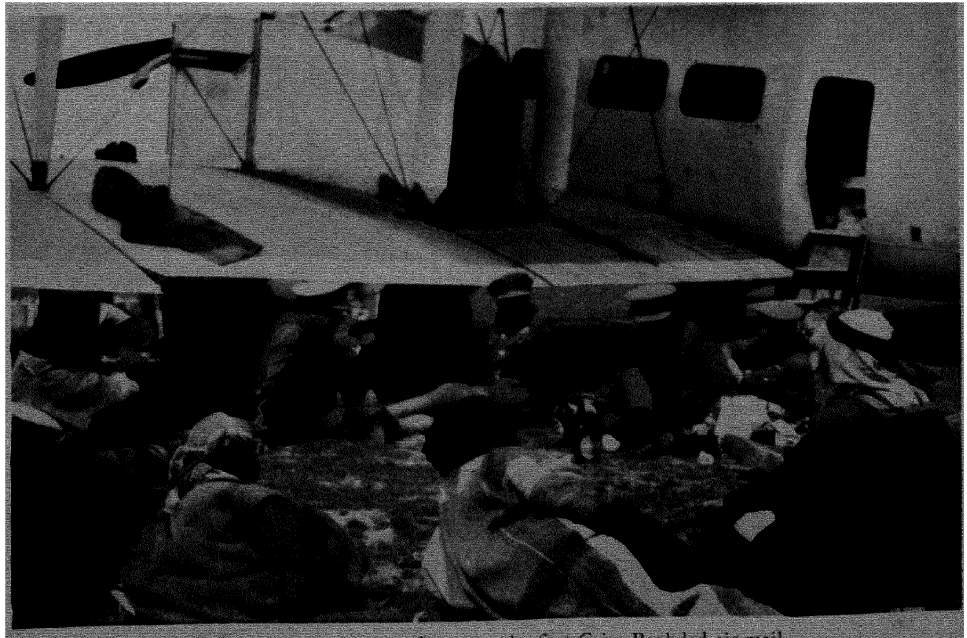
paying load; otherwise the goal of normal remunerative operation, without the aid of State assistance, can never be reached. And this means that the mail-carrying commercial aeroplane, in its essential aspects, has to be a very carefully worked-out compromise. It must, to begin with, fly sufficiently fast to ensure adequate time-saving as compared with surface transport. It must, that is to say, effect its journeys so much more quickly than is possible by any competing transport that it can rely upon regular loads at the fees charged, whatever they may be. And this air speed, though it must obviously be as high as possible, must at the same time be stabilized at a figure which enables adequate paying loads to be air-borne. In fact it is the old question again, in the air, just as it is on land and sea. Speed is expensive. It can be bought only at a price. The higher the speed the bigger, naturally, the price that must be paid; and if that price goes up and up, beyond a certain level, then the cost is so great that rates which are prohibitive have to be charged, and the whole thing ceases to be commercial. All of which means that aeroplane designers and air-mail operators have had far from an easy path to tread, and it has only been by a most careful balance between conflicting factors that the results have been possible which are already being obtained to-day. The modern mail-plane averages more than twice the speed of any other form of transport. It carries a pay-load which grows in volume for any given speed and power as the technique of design improves; and it flies with such power reserves that an ample reliability can be ensured.

Bearing in mind the main points which are at issue, it is interesting to observe the developments in civil air design which followed immediately upon the use of the first war-converted craft. The De Havilland designers,

for example, bringing to bear all their knowledge in the production of a long series of D.H. craft, and employing as their power plant one of the famous 450 h.p. Napier "Lion" engines, evolved for the airways between London and the continent a machine known as the D.H. 18. As compared with the D.H. 4a, which had carried only two passengers, this D.H. 18, an aeroplane designed purely for civil use, carried in addition to its pilot as many as eight passengers, and cruised at 95 miles an hour. A number of these D.H. 18 machines were built for use on our British routes between London and the continent, their internal equipment, so far as passengers were concerned, marking a very considerable step forward towards that luxury which is obtainable to-day. To appreciate what a stride the D.H. 18 actually represented, from a purely commercial viewpoint, one needs to bear in mind that, using only 100 horse power more than the D.H. 4a, it succeeded in carrying six more passengers than had that first machine.

While the De Havilland designers were evolving single-engined civil 'planes for the continental air-mail routes, the Handley Page Company were busy with commercial editions of their famous twin-engined craft, and a mail-plane which was typical of this new civil phase, in its early stages, was the Handley Page W. 8b. This big biplane was equipped with two 355 h.p. Rolls-Royce "Eagle" engines, and, in addition to its crew of two, carried fourteen passengers at 85 miles an hour. Machines of this type provided admirable service, for a considerable time, on the air-lines between London and the continent. They proved extremely reliable; while the comforts which their saloons provided rendered them specially popular with aerial travellers.

At about the same time the De Havilland engineers, improving on their designs as represented by the D.H. 18,



A halt for petrol in the desert on the first Cairo-Baghdad air-mail

produced a machine which was known as the D.H. 34. Still using a Napier " Lion " engine as the power plant, the D.H. 34 carried two pilots and nine passengers, cruising at 95 miles an hour. A number of these " 34's " were built and put into service on the continental air services, proving fast, powerful machines, carrying a considerable pay-load for the power expended and the speed attained.

The lessons of experience, as gained on our first British air routes, were considered to be definitely in favour of large, multi-engined aircraft, able to carry an appreciable load and to provide real comfort for their passengers and, at the same time, having a capacity, should there be any partial breakdown in their power plants, to remain in the air without needing to make an immediate landing. With twin-engined machines, however, when fully loaded and should one of their motors fail, it was found that the pilot only had the power, by a skilful use of his remaining engine, to prolong his glide earthward. The use of two engines instead of one meant in fact, in actual practice, that the airman could extend his glide, in the event of one of his engines stopping, and thus ensure a wider choice of emergency alighting points. Such an ability on the part of the twin-engined machine, though of considerable value in any emergency, was not thought to be sufficient in the all-the-year-round operation of an airway. Some still greater security, in the event of any partial breakdown of a power plant, was considered desirable. And so came the three-engined air-liner, a typical specimen of which was the famous Armstrong Whitworth " Argosy " as introduced by Imperial Airways in 1926. A fleet of these machines was put into commission, and they have flown more than two million miles, not only in Europe, but also on Empire air-lines, with wonderfully maintained

factors of safety and reliability. The "Argosy" was equipped with three motors, one in the nose of the fuselage and two on the wings. These motors were Armstrong Siddeley "Jaguars", giving the machine a total of 1,200 horse power. The air-liner had a crew of three—a pilot, an assistant pilot, and a steward; and its big, comfortably equipped saloon provided accommodation for nineteen passengers. The machine cruised, when fully loaded, at 90 miles an hour.

A considerably greater margin of safety, under operating conditions, was represented by the three-engined power plant of these "Argosy" machines. In the rare event of one motor giving trouble while in flight, the pilot could accelerate his remaining two units and, thanks to the power they gave, could maintain his machine in the air, even when fully loaded, long enough as a rule to reach some main or intermediate air station, and so avoid any need for a forced landing out in open country.

Incidentally, there was one advantage of the multi-engined principle which rendered the failure of any individual unit of a power plant even more remote than it had been before. This was represented by the power reserve obtained by the employment of several separate engines. Each unit of a multi-engined plant works under the most favourable conditions. Once he has left the ground, for example, and is in normal flight, the pilot can throttle back his engines until they are working well below their rated power, and this means, of course, an absence of stress and a minimum of wear and tear, thus ensuring a maximum of reliability.

The three-engined "Argosies" represented not only the beginning of a new era, mechanically, on the airways, but they implied also a new phase of comfort for aerial travellers. The uniformed stewards who

flew in them had well-equipped buffets from which they could serve drinks and light refreshments while in flight, and this meant the inauguration of that aerial catering service which has reached such a high state of efficiency on the aerial mail to-day.

While all such improvements were in progress, so far as the organization of the air-mail was concerned, a gratifying increase was being recorded in the volume of loads air-borne—passengers, mails, and urgent freight. Traffic demands became so pressing, in fact, before long, that it was found desirable to provide aerial carrying units of a still greater size and power; and this led to the introduction of four-engined air-liners.

It was in 1931 that we saw the first of eight big four-engined British machines, built for Imperial Airways by the Handley Page Company, and representing a fleet of the largest and most luxurious passenger-carrying aeroplanes in the world. Each of these machines—to which reference will be made again in a later chapter—weighs when fully loaded approximately 14 tons, and their four Bristol "Jupiter" engines develop a total of 2,200 h.p. Machines of this class of the "Western" type, intended for the European air-lines, carry thirty-eight passengers and a crew of four, in addition to 1,000 lb. of mails and freight; while air-liners of the same class, for use along sections of the Empire air-lines, and known as the "Eastern" type, carry eighteen passengers and 3,500 lb. of mails and freight. The maximum speed of these four-engined "Western" and "Eastern" machines is 130 miles an hour, and they cruise at 105 miles an hour. With saloons as large and as luxuriously equipped as those of railway Pullman cars, and with buffets from which uniformed stewards serve breakfasts, lunches, and dinners while in flight, these big new four-engined mail-planes represent the highest point

yet reached in aerial luxury. Not only are they so spacious and well-equipped internally, but the use of sound-deadening materials in their construction, and the fitting of the engines out on the wings, away from the fuselage, renders air travel no more noisy nowadays than a journey by express train, conversation being easily possible in the air-liner saloons, even when a machine is moving at high speed, without any need to raise the voice.

While referring to such developments in the flying stock for our air-mail routes, one may mention the tendency, as represented by our latest British air liners of the "Atalanta" type, to design machines specially for certain kinds of service. The "Atalanta" machines, four-engined monoplanes capable of a maximum of 150 miles an hour and cruising at 120 miles an hour, have been built specially for the conditions prevailing along such an Empire air route as that between Cairo and Cape Town; and they are being used, also, on sections beyond Karachi on the air-mail to Australia. With engines developing a total of 1,400 horse power, these machines have a pay-load capacity of approximately 2 tons. Their saloon accommodation is for eighteen passengers, but in actual service on the African route the saloons, equipped with armchair seats of a reclining type, are arranged for only nine passengers, this permitting an exceptional amount of space per passenger—a convenience much appreciated when flying in tropical or semi-tropical conditions. These "Atalantas" also carry, in addition to their passengers and crew, over a ton of mails and freight.

Before turning from air-mail flying stock to other matters, we should certainly mention the progress which took place in respect of marine-type commercial aircraft for our flying routes. Quite early in the post-war

development of British air transport a commercial service was instituted, by flying-boat, to and from the Channel Islands; and on this route machines known as the "Sea Eagle" type were employed. Each of these flying-boats was driven by a 355 h.p. Rolls-Royce engine, and carried six passengers at a cruising speed of 85 miles an hour. Then, in 1926, came larger twin-engined flying-boats of the "Swan" type, fitted with Napier "Lion" engines and having accommodation for twelve passengers, their cruising speed being 90 miles an hour.

Such "Swan" machines provided a stepping stone for the next stage in civil aircraft of a marine type, as represented by the three-engined "Calcutta" flying-boats used on Mediterranean sections of our Empire air-lines. Driven by Bristol "Jupiter" engines, these "Calcuttas" carried fifteen passengers and a crew of four at 90 miles an hour, and proved themselves both airworthy and seaworthy to an admirable degree, rendering splendid service to Imperial Airways, under all sorts of operating conditions, on the Mediterranean stages of the air-mail routes to India and Africa. Then, after these three-engined "Calcuttas", came our four-engined "Kent" flying-boats, as used in the Mediterranean at the time of writing. Each of these fine machines is driven by four Bristol "Jupiter" engines, developing a total of 2,200 horse power, and carries sixteen passengers and 5,100 lb. of mails and freight at a cruising speed of 100 miles an hour. Nor does this represent anything like a limit in marine air design. Far from it. What are now proposed are giant multi-engined flying-boats capable of operating regularly on ocean stages of an aerial mail between this country and North America. But that is an aspect of air-mail development to which we shall find it more convenient

to refer in detail later; while in our chapters dealing specifically with the Empire air-mails, occasion will be taken to refer again to the big multi-engined machines developed by Imperial Airways.

At the moment it is more our aim to show how a rapidly-developing organization in ground equipment, as well as in machines, has enabled the aerial mail not only to fly rapidly, and thus fulfil its main purpose, but also to do so with a high factor of reliability. And here, naturally, one comes to the problem of the weather. The air-mail, like other forms of transport, must operate in bad weather as well as in fine. Records show that in 1924, when Imperial Airways was established, approximately 30 per cent. of flights had to be cancelled owing to various causes, chiefly bad weather; whereas to-day, thanks to a steadily improving organization, the Company has a regularity percentage of 96 in its scheduled flights completed in Europe, and of 98 on its Empire air services; and this speaks for itself as an evidence of the reliability of the modern flying post.

Reference has already been made to the wireless telephone, giving pilots immediate and accurate data as to weather changes, and also its ability to provide them with their position or bearing by wireless; and this, of course, plays a big part in the dependability of the air-mail. Another important point in securing that all-the-year-round reliability which is vital in the transport of mails is the growing experience of pilots—the accumulated knowledge gained during years of flying. And such experience is of special value when it is a case of overcoming bad weather. Another point found to help considerably in maintaining an air-mail to schedule when the weather is unfavourable is the use of such large multi-engined aircraft as we have just been describing in this chapter. Here, of course, the question is one of

confidence. The pilot of a four-engined air-liner knows he has a big reserve of power which is always at his service, and that in the very rare event of a unit failing while in flight, he has three other engines on which he can rely, and which will carry him on.

Wind the air-mail pilot no longer fears, as did pioneer airmen. In a general sense, it has ceased to be an enemy from the viewpoint of any interruption of the aerial services. Very rarely indeed, nowadays, it may happen that a gale of wind attains such violence as makes it risky to handle aircraft on the ground, and this may render it advisable, just once in a while, to delay or cancel the start of some service. Putting matters in a nutshell, however, one may say that our air-mail services now operate without interruption even in gales which cause delays or cancellations in sea services; while conditions such as rain, hail, or snow imply as a rule nothing more than an inconvenience, and do not prejudice reliability.

The modern air-mail pilot has an ability, owing to the speed and power of his craft and the efficiency of the weather-reporting service, to avoid much of the bad weather that may be lurking along his route. He can, for example, and often does, fly round thunderstorms. He can avoid areas of heavy rain, or squalls. He can get out of low-lying fog or cloud by climbing to higher altitudes, there navigating by wireless, and being in touch always with one or other of the land stations below. In fact one may say that, under present operating conditions, it takes something very exceptional in the way of weather to cause interruption or delay on a well-organized aerial mail.

The flying mail has, of course, one grim enemy; and so has transport by land or sea. And that enemy is fog—not just local fog, because that can be coped with, but

such dense, widespread fog as, in winter, sometimes stretches from London down to the coast and across the Channel and over France as far as Paris. Then the air-mail, like our railways or our steamships, has to do the best it can in abnormal circumstances. But, as air-mail records now show, such occasions as these are fortunately few and far between. What has to be dealt with, as a rule, is a patchy, shifting, local sort of fog, and in such conditions as these, thanks to the wireless, and the confidence inspired by multi-engined aircraft, together with the existence of a chain of main and emergency alighting grounds, our air-mail services manage to do remarkably well.

It is rare nowadays, as figures indicate, for fog to do more than cause a temporary interruption of the aerial mail. The worst that may happen, generally speaking, is a need to divert air traffic so that machines can alight at stations lying just outside any prevailing belt of fog. And the keynote of such an encouraging state of affairs is simply ground organization, combined with the skill and experience of pilots and the reliability of multi-engined modern aircraft. In transport under any conditions, whether by land, sea, or air, organization is, of course, the keynote of dependability.

In combating fog nowadays, railways and steamship lines are constantly improving their methods. Special fog-piercing lights are being introduced, and electrical devices of various kinds developed. And the same may be said of the air-mail, in regard to the special problems which it has to face. Its organization is being reinforced constantly, by the aid of science, enabling flights to be undertaken under conditions which, only a year or so ago, would have appeared hopeless. Apart, of course, from starting a flight from any fog-bound aerodrome, and flying above fog while in transit, mail-planes need to



The departure from the Hounslow air-port, on August 25th, 1919, of one of the first 'planes operating the pioneer London-Paris air-express

have the power of alighting safely at aerodromes obscured by fog. Here, however, at any rate at present, the realm is one of experiment. Already an aircraft can be guided until it is right above a fog-bound 'drome, while many devices have been tried, and others are now being tested, to enable a pilot, after he has glided down through the final layers of the fog, to make a safe contact with the ground. Special fog-piercing lights are sunk beneath the alighting area, being covered by sheets of thick glass which enable the rays to shine upward. The aid is being invoked of various kinds of wireless beam, acting upon instruments in the pilot's cockpit and serving like invisible searchlights. Captive balloons, moored just above the top of a fog and enabling pilots to judge their angle of descent in gliding to the ground, have also been tested—as have devices which cause a machine to "flatten-out" automatically, at just the required moment. All such methods, and many others, have been under review. But this field, as we have said, is still one of experiment, not having yet entered a practical commercial phase; though there is no reason why, in due course, it should not do so. Until any new device has been proved over and over again, however, under actual operating conditions, it cannot be adopted for regular use on an air-mail, or on any other form of commercial service. And in any case, so far as this problem of fog-fighting is concerned, we must be prepared to be patient. Neither land nor sea transport, after all their operating experience, have succeeded in vanquishing this enemy, though they have certainly made considerable progress towards that end; and with the air-mail, as with surface travel, we must be prepared to advance stage by stage, making a little progress here and a little there, but not expecting success to crown our efforts immediately.

When air-mail transport started, fourteen years ago, there were certain fundamental questions to which it was required to provide answers before it could be regarded as a practical proposition under ordinary commercial conditions of working. It was, for example, called upon to give an effective demonstration of its speed. This it did quickly enough, showing that it could operate, regularly, at more than twice the pace of any other form of transport. Then there was the question of its safety. Here again, by actual records over a period of time, flying has been shown to have none of those inherent dangers with which it was so often credited prior to our post-war era of civil aviation. Another vital question has been that of reliability. Here, too, as the figures we have quoted show, the air-mail has nothing to fear, operating as it does to-day, on a widespread scale, with an all-round dependability of just on 100 per cent.

This leaves yet one more problem to be dealt with, and that concerns the ability of the air-mail to function as an ordinary commercial enterprise without needing continued assistance from the State.

Here, naturally, there are many factors to be borne in mind. In its early days, as we have shown, the flying mail was operating with converted war-craft which left a good deal to be desired from a commercial aspect; while the overhead costs of the services had to be charged to only quite a small volume of traffic. This meant that it was extremely difficult to arrive at anything like economic results. Machines were costly to operate. There were only a few routes in existence. Traffic was in its infancy, loads being often scanty. Conditions began to improve immediately, however, when machines were forthcoming which had been designed specially for commercial purposes, and which gave better figures for the loads carried for any given expenditure of power.

At the same time it became possible to extend the air-mail routes and, by judicious propaganda, to attract to these routes a bigger all-round volume of traffic.

In the early days of British air transport a considerable proportion of the total income was represented by subsidy payments from the State; but in recent stages of development the position has been far more satisfactory, upwards of 50 per cent. of the total income being represented by traffic receipts and the remainder by State aid. At the present time, with traffic increasing and operating costs decreasing, the tendency is for a still bigger proportion of the total income to be represented by earned income in the form of payments for loads carried. In this regard it is gratifying to know—as is unquestionably the case—that in the endeavour of air transport to establish itself on a commercial footing our British air-mail lines have gone farther in the desired direction than those of any other country. Abroad, without going into detail, one may say that the tendency in many quarters has been to view civil air transport more as a reinforcement of military aviation than as an ordinary commercial proposition. This has led to developments which have certainly been unsatisfactory from any business point of view—entailing, for example, the employment of more machines on any given service than the volume of traffic really justifies. But with British air transport, when the subsidy scheme for Imperial Airways was laid down in 1924, it was specified clearly that the payments by the State would decrease gradually, year by year, and that the Company must use every endeavour to make its operations self-supporting with the least possible delay. And that policy has been followed in all subsequent development. Machines have been employed which embody every improvement calculated to enable them to carry bigger loads, at given speeds, for any specified

horse power; while no stone has been left unturned to lower operating costs and, at the same time, to attract bigger volumes of traffic. The result to-day, after fourteen years of progress, is that British air-mail transport is already well on its way to becoming self-supporting. More routes are being opened up. Traffic continues to improve. Machines are in design which carry still bigger pay-loads. But with these aspects, which are concerned more with the future than with the present, we shall deal more fully in a final chapter.

CHAPTER VI

THE EUROPEAN AIR-MAIL NETWORK

Growth in the mileage of the Continental routes—1919 compared with 1933—A visit to the London air-port—Dispatching the flying mails—Speed of the air deliveries throughout Europe—How to use the aerial mail—The system explained—Importance of the blue label.

STRIKING illustrations of air-mail progress, as between early days and the present time, are to be afforded by a comparison between some of the early routes and charges and those in existence on our aerial system to-day. In November, 1919, for example, when mails were first carried in the 'planes on the London-Paris route, it cost as much as half-a-crown to send an urgent letter by air between the two capitals. To-day the charge is not more than fourpence. And similar tales of progress can be cited in other directions. Take, for instance, the question of the development of routes. In its early days the European air-mail system did not total more than about 3,000 miles. To-day, however, the total stands at approximately 60,000 miles of highly-organized routes, over which a constantly growing volume of traffic is in flight.

Nothing could be more striking, if one studies it over a period of years, than the increase in air-mail traffic to and fro above the Channel. Twenty-four years ago, when Blériot first blazed that Channel air trail by making the first aeroplane flight above it between France and England, he predicted on alighting at Dover that before many years had passed that historic flight of

his would be repeated by big air machines carrying their passengers, mails, and freight—a prophecy which was greeted with a good deal of scepticism in many quarters, those early flights being regarded purely as freak performances, and the men who achieved them as aerial acrobats who were doing something which no ordinary people could be expected to accomplish. But Blériot, like other pioneers, has lived to see what he predicted borne out in actual fact. Not long ago, in his own private aerial limousine, he recrossed the Channel from France to England, and by that same air route nowadays, as a contrast to his first lonely flight of 1909, there fly at busy seasons more than fifty aircraft daily—passenger-planes, mail-planes, and big aerial freighters. From dawn to dusk the drone of aero-engines is heard along this Channel skyway, and the aircraft of France, Germany, Belgium, and Holland, as well as those of Britain, now wing their way daily to and from our busy London air-port. And the tale of progress stands revealed in machines as well as in routes and traffic. When Blériot wrote his name in history, by flying in 37 minutes from Calais to Dover, the tiny monoplane in which he sat was driven by an engine of only 25 horse-power, and could carry but one man, its pilot. To-day, when Blériot visits our London air-port, he sees standing out on the departure platform, ready for their flights above the Channel, giant air-liners of metal weighing when fully-loaded more than 14 tons, and capable of ascending into the air with as many as forty-two people on board—thirty-eight passengers and a crew of four. And that London air-port of ours tells in itself a remarkable story of aerial progress. In early days London-Paris air-mail traffic was conducted from a war-time 'drome at Hounslow at which the accommodation was primitive, to say the least of it. Just a few

sheds, and the necessary Customs facilities, represented the organization then.

In 1920 it was decided for various reasons to transfer the London air-port from Hounslow to Croydon. One of the principal arguments, in favour of this change, was that it was much more convenient to operate air traffic between London and the Continent from an air-port lying to the south rather than to the north of the metropolis, this obviating the need for machines to fly round the outskirts of London in order to reach their destination. Another important fact concerned visibility. In the locality chosen at Croydon, experiments showed, air traffic was less likely to be affected by fog in winter than would be the case at a 'drome like Hounslow, the area lying just outside the fog-zone which so often obscured the metropolis.

At first, when operations were transferred to Croydon, the air-lines had to be content with temporary wooden premises, and an hotel housed in a big bungalow-like structure. The whole 'drome, in fact, rather resembled at that period a wild-west township of the early mining days. But facilities of such a temporary character were soon found unsuitable for the ever-growing traffic, while it was also considered desirable, as aircraft grew bigger, to enlarge the size of the manœuvring and alighting area. This led to an Air Ministry scheme for the demolition of the temporary structures, the widening of the aerodrome, and the erection in a convenient position of a fine block of administrative buildings, workshops, and sheds, and the provision also of a modern aerodrome hotel. This work was duly put in hand and London's new air-port, now one of the finest in the world, was formally declared open in 1928 by Lady Maud Hoare, the wife of the then Air Minister, Sir Samuel Hoare.

Dominated by the tower from which all the aerial traffic is controlled—and a description of the working of which we shall give in a later chapter—the London air-port has already become one of the sights of London, to which people flock at week-ends just as they might to any of the other show-places of the metropolis. And it is a revelation to those who see it for the first time, giving them an insight such as they have never had before of what air traffic already means in the general scheme of transport. Down from the West-End offices of the air companies, in luxuriously equipped motor coaches, come the passengers who are about to embark in air-liners outward-bound across the Channel. From the entrance-hall of the main buildings one enters a fine waiting room like that of a railway terminus, in which big indicators tell you all you want to know as to the times of departure and arrival of the aerial traffic of the day. Flanking the waiting-room are the offices of the various companies, while large sections of the main building are devoted to the Customs and Freight Departments. Walking through on to the wide platforms, passengers embark in their waiting 'plane, while a feature of the air departures is the driving up of the G. P. O. motor-van carrying the urgent letters which are to be air-borne, and which can be posted nowadays in special air-mail pillar-boxes in various parts of London. Postal facilities exist also on the Aerodrome itself, and at the Imperial Airways terminus at Victoria, thus enabling one to post a last-minute letter up to within only a short time of the actual departure of any of the services. An admirable organization now exists, in fact, for those who send their letters by air, or for those who travel themselves in the big aircraft. In the well-equipped hotel adjoining the air-station one can, for example, book a room overnight if one is



Loading mails into one of the air expresses of the pioneer daily London-Paris service of 1919

departing by an early-morning service, and this means that one is right on the spot at the moment of departure, without any need to travel down from town to catch one's 'plane.

From dawn until dusk, nowadays, and even at night as well, our big London air-port is in operation. At busy times, in fact, it never sleeps. During the hours of darkness mail-planes ascend or alight, while in the early-morning hours—particularly in the summer—machines are departing which carry loads of London daily newspapers, these journals being on sale at breakfast-time at various resorts on the other side of the Channel. Then, later on, come the departure and arrival of the big luxury passenger 'planes, this continuing at frequent intervals throughout the day, while every now and then, also, one sees a specially chartered machine leaving on some urgent flight across the continent. To realize how transport by air is growing one has, indeed, only to spend an hour or so at Croydon during some busy spell at the present time. Yet there was a period, as officials will remind you, when the tiny pioneer craft flying daily to Paris carried passengers just in twos and threes, and there were not more than twenty or thirty bookings during the course of a week. From that first trickle of traffic, recorded in 1919, passengers soon increased to fifties and hundreds weekly. By 1927, records show, the weekly total in and out of London had grown to 1,000, while by 1928 the figure had increased to 1,500. Now to-day, at periods of pressure, between 2,000 and 3,000 passengers are air-borne to and fro across the Channel weekly.

Similar are the tales of progress told in respect of air-borne mails and merchandise. Tables indicating the growth in air-mail transport show that nine years ago Imperial Airways were carrying not more than about

200,000 letters a year. Then the total went up to 500,000, while by the year 1927-1928 it had increased to something like 2,000,000 annually. In the following year there was yet another appreciable increase. By the year 1929-30 the total stood at just on 4,000,000. By 1930-31 it was at 5,000,000; while during a recent period of twelve months it reached, and exceeded, a total of 6,000,000. Reckoning all the air-mails leaving London, and comparing the first four months of 1933 with a similar period in 1932, an increase is shown of more than 20 per cent.; while there was a growth of approximately 14 per cent., for the same period, in the volume of parcel air-mail traffic.

There has been a great and gratifying increase, more especially in recent times, in the use made by business houses of the aerial mail. Merchants and business firms no longer employ the air-mail occasionally, or in any spasmodic way. They are now learning to use it regularly, finding that the speed and reliability it provides, combined with the reasonable nature of the charges, renders air transport a thoroughly good proposition from purely business points of view.

The growing network of European air routes enables facilities which are constantly being augmented to be offered in mail transport by aeroplane. Air dispatches from London, for various destinations throughout Europe, are now available in the mornings, afternoons, and evenings, and the ramifications of these air services are in fact becoming so extensive that big firms are adopting the expedient of appointing some member of their staff to make a special study of mail dispatch by air, in order that prompt advantage may be taken of new services and facilities.

It is interesting, as a definite evidence of air-mail progress, to note the extensive nature of the dispatches

which are now scheduled from London. As early as 5.30 a.m. there is an outward-bound dispatch for such countries as Austria, Denmark, and Sweden. At 6.30 a.m. there is another for, among other places, Germany, Hungary, and Switzerland.

At 7.15 a.m. another of the flying mails is sent off for areas such as Italy, Poland, and Spain. At 10 a.m. there is a dispatch for Belgium, and at 11 a.m. one for Holland, Denmark, and other parts. At noon a mail leaves for Italy and Switzerland, at 4 p.m. another for Belgium, followed at 5 p.m. by one for Holland. Then comes the 8 p.m. night mail for a large number of European destinations, including Czechoslovakia, Estonia, Greece, Roumania, Russia, and Turkey.

In addition to these daily dispatches, there are special weekly services of various kinds. Each Wednesday, for example, there is a 2 a.m. dispatch for destinations such as Central America, Brazil, and Chile. Then at 7.15 a.m. on the same day there is a dispatch to South China and French Indo-China, while at 1.30 p.m. there is the Imperial Airways mail to Kenya, Tanganyika, Rhodesia, and South Africa. At 5 p.m. on Wednesday there is the dispatch of the weekly air-mail to the Dutch East Indies, the Straits Settlements, and Malay States. On Thursday at 8 p.m. there is a dispatch for Australia and New Zealand, on Friday one for Canada, and on Saturday, in addition to dispatches for the Argentine, Peru, and other destinations, there is the departure of the Imperial Airways mail for Egypt, Iraq, and India.

On European routes the facilities offered are, as has been indicated, now very extensive. Those catching morning dispatches from London with urgent letters can be assured of delivery that same afternoon in Continental cities such as Paris, Brussels, and Amsterdam; while mails dispatched at mid-day are at points as distant

as Milan the next morning, and also in most parts of Switzerland. As for evening air dispatches from London, these are now delivered at points such as Berlin or Copenhagen on the following morning. By the same afternoon, also, they are in cities as far off as Helsingfors or Rome; while on the second day after their dispatch from London they are at Riga or Athens, and on the third at a city as distant as Istanbul.

Experts on the aerial mail, when discussing the growing network of services, stress the need which exists for making a study of these important facilities, so that prompt advantage may be taken of any particular service, when the occasion arises, without risk of error through too-late postings or insufficient stamping. Recently officials have been examining certain complaints as to delays in the delivery of air-consigned letters, and in almost every instance they have found that it was not the air transport service which was to blame. What happened was that people inadvertently posted their letters just too late to catch one or other of the outgoing long-distance weekly services, with the result that their letters had to await the next dispatch, and although in each case the flying service operated to schedule, the days already wasted could not of course be made up. To make an effective and regular use of the air-mail is now quite a simple process. One should be careful, always, to make sure that one's letters are stamped correctly, and are not over-weight. Insufficient stamping is often a cause of delay, while another point to remember is that a blue air-mail label, obtainable free of charge at any Post Office, needs to be fixed to the top left-hand corner of every air-mail packet. Letters bearing just the words "By Air-Mail" written on the outside of the envelope will be accepted, but no responsibility is taken by the Post Office for any delay

that may occur, and this simply for the reason that whereas the blue air-mail labels are clearly seen by the sorters, and letters bearing them placed immediately in special racks, a letter with only the words " By Air-Mail " written on it may escape detection, and may thus remain among the letters sent by the ordinary post.

CHAPTER VII

TRAFFIC ON THE AIR-MAIL ROUTES

European air companies—The policy of co-operation—Land-sea-air routes—The time-saving of air-rail facilities—Variety of air-borne loads—Strange cargoes—Bullion by mail-plane—The flying Santa Claus—Inland air-mails

ONLY those actually engaged in civil aviation, nowadays, can appreciate how great is the development of air-mail traffic; but some idea of its ramifications may be gained by glancing at one of the latest maps of the network of European routes. This shows that there are now as many as 140 stations throughout Europe to which air services operate from London, and approximately half of these destinations are within a day's flying of England. As for others, few are more than a couple of days from Croydon by the accelerated and inter-connected services which are becoming available. Throughout Europe there are more than twenty air transport companies, and frequent conferences are held at which improved facilities are arranged for through air-mails in all directions. In all such speeding-up plans, so far as mails and parcels are concerned, a strong policy of co-operation is being adopted between the transport organizations of land, sea, and air. It is recognized that air transport does not supercede the older methods of travel by land and sea. What it does is to augment them, providing a new and more rapid method of transit which can be made to dovetail in with existing facilities. Thus one finds

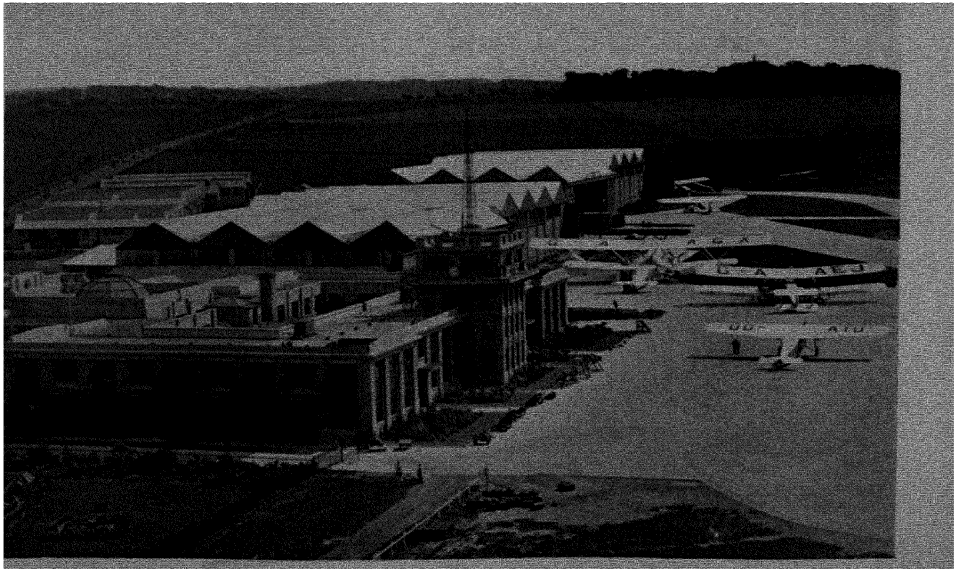
airways, railways, and shipping lines all combining to expedite the transport of urgent mails and packages, and only the other day, so far as the co-operation between air and sea travel is concerned, a striking example was provided of what such combined facilities can offer. In this case an urgently-consigned packet was handed in for dispatch by mail-plane, air-liner, and ocean-liner over a distance of 12,000 miles from Los Angeles, California, to Poona, in India. After being flown by air-mail from Los Angeles to New York, this parcel was put on board an ocean-liner departing for Europe, and on arriving in London was sent to the Croydon air-port to catch one of the outgoing air-liners for India, the result being that it completed its journey in 18 days, a saving of as many as 15 days over ordinary methods of transmission. A growing use is now being made of such combined air and sea routes. A parcel dispatched say from New York to Cairo reaches its destination in 10 days, as against 21 or 23 by any other means; while in the case of an urgent consignment from New York to Baghdad the air-sea time of 11 days compares with from 36 to 42 days by ordinary surface transport. To destinations along the African airway the time-savings are now proving particularly valuable. Again taking New York as the dispatching point, a parcel will have crossed the Atlantic and gone on say to Cape Town in not more than 18 days, as against 28 to 32 by ordinary means.

Along the routes of Imperial Airways there are approximately fifty main and intermediate stations, and these are now connected by an express air-rail service with approximately 150 railway stations covering the whole of this country. This system, which was established in 1931, and which is being made use of on a growing scale, is simple as well as expeditious. Urgent parcels, handed in at the railway stations of any of our

big provincial cities, have special labels attached to them and are forwarded to London by the next express train. From the terminus in London they are collected by an Imperial Airways van and taken to the air-port at Croydon, being then dispatched by air to their destinations on the next out-going 'plane. As an example of time-saving by this system, on air-mail journeys between England and destinations in Europe, a parcel from Plymouth to Marseilles completes its journey by train and 'plane in two days, as compared with four days by train and boat. In the case of parcels sent by air-rail from England to destinations along the Empire air-lines, remarkable time-savings become possible. A consignment dispatched by train and boat from Manchester to Karachi would be approximately 45 days in transit, as compared with only 7½ days by air-rail; while in the case say of a parcel from Glasgow to Kisumu, on the African airway, the air-rail transit time would be 10 days, as contrasted with well over 20 by surface transport. This air-rail system also works in the reverse direction. Parcels, that is to say, are accepted at any of the stations of Imperial Airways for dispatch by train to London, continuing on from London to destinations on any of the railways, by the next express train.

In early days, if you wanted to send a parcel weighing 1 lb. from London to Paris by aeroplane, it cost you 7s. 6d.; but to-day the rate, including express collection and delivery, is less than a shilling. At first there was not more than a handful of parcels to deal with every day; but now it is a question not of pounds but of tons. At busy times, for example, between 50 and 60 tons of urgent freight incoming and outgoing, are handled at the air-port during the course of a week.

No experience could be more interesting than to make a tour of the parcels and freight departments at



The London air-port to-day. A view from above, showing machines on the departure platform

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the London air-port. You quickly realize, while so doing, that one of the advantages of air transport, in addition to its speed, lies in the lessened risk of damage in transit, or of pilferage, when a consignment is air-borne, and it is for this reason that insurance rates are considerably cheaper by air than by other forms of transport. Many valuable pictures, and works of art, are now consigned by airway. They not only travel swiftly, but receive individual attention at every stage, and are handled throughout with the utmost care. Not long ago, for example, when Manet's picture, "A Bar At the Folies-Bergere", left this country for exhibition in Paris, it went over in one of our big British air-liners to Le Bourget, and so valuable is this famous painting that Mr Kennedy North, Keeper of the King's pictures, flew in the same machine with it so that he could have it under his eye throughout the entire trip. The absence of jolting or vibration in air transport makes the airway an ideal means of transit for parcels and packages containing delicate electrical apparatus, or such things as wireless valves and loud-speakers. Urgently required medicines and vaccines are also found frequently among air-borne parcels; and because individual attention can be paid to each consignment, and for the reason that journeys which might otherwise occupy days are accomplished by air in a few hours, the sending of livestock by flying routes—such as day-old chicks, pedigree dogs, and animals for circuses and zoos—has been greatly on the increase during recent times.

The variety of the parcel loads which now leave Croydon by air-mail can be illustrated by picking out, quite at random, some consignments which have actually figured recently on aerial waybills. These include oil paintings valued at many thousands of pounds; wireless valves consigned to the Royal Palace at Bucharest;

pump-fittings for a plant in the Suez Canal; special gas-masks being rushed out to fight an obstinate fire in some mines in India; spare parts for a motor-car party stranded in Africa; consignments of cut flowers being flown to the London markets, and day-old chicks and hatching eggs for Germany, Russia, Roumania, and other destinations abroad.

Strange are the cargoes which are often air-borne in big mail-planes outward-bound from London. Not long ago a regular consignment of a certain medicine, prescribed by a doctor in London for a patient in India, and needing to be taken as soon as possible after it had been prepared, went out regularly on the Saturday machine from Croydon, reaching its destination within six days of leaving London. On another occasion a consignment of beautiful toys, bought in London for the children of an Indian Rajah, were consigned by air not only to save time but also to minimize any risk of their being damaged. Another parcel, rushed down to Croydon one day just in time to catch an outgoing Indian mail-plane, was found to contain a false beard, urgently required in connection with some private theatricals which were to be given in an Indian city.

As for the way in which the flying mail is aiding modern commerce, it may often happen, nowadays, that some small but vital piece of machinery may need replacement in a mining-plant located somewhere far-distant along the Indian or African air-lines, and until that spare part can be obtained, and placed in position, the section of machinery involved may have to stand idle, and not only the machinery but perhaps a number of men as well. Here is a case in which time is money; and here, therefore, you have the value of the speed which the air-mail provides, because the additional cost involved by air express transport—and which is based on the

actual time-saving obtained—is very well worth while if it means, as it does, so many fewer days' idleness for some portion of a big plant. Again and again, in such circumstances, the air-mail proves a boon. Essential parts are ordered by cable, and sent out by air-mail, with such rapidity that prolonged idleness for vital pieces of machinery is obviated, the time-savings involved being in many cases a matter of weeks rather than of days.

Among the many instances that can now be adduced of the utility of the aerial mail, none could be more conclusive than one which transpired during the early stages of the African route. A party of motorists who were not far from the Juba station had a breakdown with their car which prevented them from continuing their journey until they could obtain a spare part from England. They cabled immediately to the manufacturers in this country who, in less than fifteen hours, managed to rush the part required up to London and on to the outgoing air-mail from Croydon. The result was one which amazed those marooned travellers, and gave them an illustration, which they will never forget, of what modern air-mail transport can accomplish. For, though they were 5,000 miles from London, and in a remote locality where, had it not been for the air-mail, they must have waited weeks for what they wanted, actually in not more than seven days from the dispatch of their cable to England the essential part they needed was handed to them at the Juba air-station by an official of Imperial Airways. In a letter received in London from one of the members of this party, he wrote: "It revolutionizes one's idea of time and of distance to be able to procure a vital spare part thousands of miles from England, and to receive this in the heart of Africa, only a week after the telegraphed request was made."

Motor-car manufacturers are now using the air-mail, whenever the time-factor is important, on a rapidly-increasing scale. Often, at the present time, a motorist on the continent will cable to London for some spare part for his car, and across this goes to him immediately in the next air express, frequently effecting a saving not merely of hours but of days. Packages dispatched by air-mail from Croydon at mid-day are delivered in Paris the same evening, while parcels collected in London at the close of business hours are flown across the Channel and delivered as soon as business houses open the following morning. Parcels dispatched from the provinces during the morning by the air-rail service already mentioned, and which arrive in London during the afternoon, are collected at the railway termini, taken immediately to Croydon, and flown to Paris on the evening service, being delivered the first thing the following morning.

Important industries are making a growing use of air-mail transport for the dispatch of samples of all kinds. Coffee planters in Kenya Colony are now able, for example, thanks to the African service, to get samples of their crops through to London in a matter of days rather than of weeks, while Egyptian cotton crop samples are also consigned to London by air-mail. Perishable goods of all kinds are included constantly in flying mail cargoes, mangoes and other tropical fruit now arriving in a fresh condition in London, thanks to the speed with which they are air-borne to England along the Empire routes. Not long ago, owing to the fact that Brussels sprouts are not normally available in Egypt in winter, some of the big hotels in Alexandria and Cairo conceived the idea of having a consignment sent out specially by the Indian mail-plane; and so, also, on another occasion, were a number of lobsters.

As a contrast to such odd loads, we should certainly not forget to mention that nearly all the bullion dispatched from London to the Continent is now air-borne. So picturesque, as well as practical, is this carriage of gold in bulk by air that it is a subject worth considering in some detail. The " bullion-plane ", passing high above land and sea, has in fact a romantic aspect which appeals to the imagination. Gold transport by air-mail is, as a matter of fact, now a purely business proposition, already favoured greatly by banking institutions. When urgent shipments have to be made between Governments or banks in Europe, the first thought is, as a rule, to earmark the consignment for air-mail dispatch. The advantages of so doing are considerable. Insurance rates, for one thing, are lessened greatly ; interest charges, for another, owing to the speed of air dispatch, are reduced ; while a number of incidental problems, affecting transport and shipment, are also solved. The whole operation, in fact, is simplified as well as expedited.

There are two main aspects of gold shipment by air-mail. One concerns the occasional transport of urgent loads, while the other is the possibility of carrying loads of gold, regularly, for long distances, between mines and centres of distribution. An occasional movement of gold by air, even in appreciable quantities, is already a perfectly satisfactory operation. A modern multi-engined mail-plane is capable of carrying 3 tons or more, and the use of several such machines enables a bulk shipment of an appreciable size to be made in a few hours between London and any destination on the continent. The gold usually takes the form of bars, packed in sealed boxes. Motor-vans transport it from the vaults in London to the air-port at Croydon. Here the mail-plane which has been chartered waits on the departure-platform. It is a simple and rapid

process to transfer the bullion to the air-liner's hold, and soon it is in flight to its destination at 100 miles an hour. Very large quantities of gold, representing in value many millions of pounds, have been air-borne from time to time between London and various destinations on the Continent; while shipments have also been made, as required, along the Imperial Airways' Empire routes.

It is the practicability of such occasional shipments which lends interest to the question, now being considered, of instituting regular gold transport by mail-plane between big producing mines and the centres to which bullion is consigned in bulk, and to which it travels at present by land or sea. Such projects would, obviously, entail the establishment of facilities which do not exist at present. The loads needing to be transported would be considerable, representing in some cases a good many tons each week. To deal with such bulk traffic regularly, and on an economic basis, would imply the use of large weight-carrying aircraft, adapted specially for their task. Such facilities might, in fact, develop into the use of a number of large aircraft, reserved specially for traffic to and from the mines, and carrying gold in one direction, and mining officials, stores, and other special cargo on return flights. An example of a system evolved on such lines is provided already in New Guinea. Here an air route operates regularly between the sea-coast and the mountain-mines at Wau. Ore is flown down to the coast, and mails, stores, and equipment carried on return flights. In this case a vital need exists for air transport, inasmuch as aircraft can accomplish, in less than an hour, a journey which by mountain roads or trails would occupy nearly a fortnight. The development of commercial aircraft, enabling larger loads to be carried for any given

horse-power, now renders increasingly practical the transport by air, in bulk, of cargoes in respect of which the time-factor is important, and there are no technical difficulties that cannot be overcome in carrying gold in bulk by air from, say, African mines to the European market. The problem is one of economics; of developing a service which is practical from a commercial point of view, not only to mining executives but also to air transport. Every day our air-mail services widen their scope. The transport of bullion by air has already found such favour that its logical development now appears to lie in bulk transport by aeroplane, on a systematic scale, between mines and the various countries to which gold is consigned.

The more one studies air-mail traffic in and out of Croydon, nowadays, the more interesting are the facts which emerge. We have, for example, already mentioned briefly the transport of livestock by mail-plane, and so important has this form of aerial traffic now become that Imperial Airways have just established a special department to deal with it. The existence of such a special department ensures not only that animals make their journeys in a minimum of time, but also that they receive individual care, being fed and attended to, as required, while in transit between London and any destination on the continent. When valuable animals are sent from this country to appear in Shows on the continent, it is essential not only that transit time should be cut down to a minimum, but also that vibration and jarring should, so far as possible, be avoided. In this respect the air-mail is, of course, unrivalled. Not only is an air journey smooth and free from those trans-shipments from train to boat, and back again to train, which are otherwise unavoidable, but animals travel in a lined compartment, well protected from draughts or

damp. A list of some of the recent livestock actually consigned by aerial mail is appended :—

Dogs	Bees
Cats	Turkeys
Mice	Insects
Day-old Chicks	Small bears
Pigeons	Lion cubs
Cage birds	Rare zoo specimens
Fish in tanks	Monkeys.

Not long ago all the poultry sent from one of the breeding districts on the continent to compete at a show in London was consigned by air-mail, the speed of the journey by air enabling the birds to remain two days longer at their home farm, before dispatch, than was the case with poultry forwarded by surface transport. Aircraft are often chartered to convey racing pigeons to some point on the continent, from which they are released for flights back to this country.

Recently, when a big mail-plane alighted at Croydon from the continent, the officials found that part of its interior had been transformed, temporarily, into a flying menagerie, containing parrots, monkeys, and a bear, together with a number of tropical fish in tanks. On another occasion the occupants of an incoming machine were a number of live alligators, travelling in special crates. In another case the officials were called upon to instal in a machine a den in which a fully-grown lion, accompanied by its trainer, was air-borne from the continent to London to take part in a circus. On yet another occasion a big craft had the interior of its hull arranged so that a valuable horse might be air-borne from abroad.

Consignments of day-old chicks, if placed on one of the early-morning mail-planes leaving Croydon, reach



Air-mail going aboard one of the big multi-engined air-liners at the Croydon air-port

the London air-port. You quickly realize, while so doing, that one of the advantages of air transport, in addition to its speed, lies in the lessened risk of damage in transit, or of pilferage, when a consignment is air-borne, and it is for this reason that insurance rates are considerably cheaper by air than by other forms of transport. Many valuable pictures, and works of art, are now consigned by airway. They not only travel swiftly, but receive individual attention at every stage, and are handled throughout with the utmost care. Not long ago, for example, when Manet's picture, " A Bar At the Folies-Bergere ", left this country for exhibition in Paris, it went over in one of our big British air-liners to Le Bourget, and so valuable is this famous painting that Mr Kennedy North, Keeper of the King's pictures, flew in the same machine with it so that he could have it under his eye throughout the entire trip. The absence of jolting or vibration in air transport makes the airway an ideal means of transit for parcels and packages containing delicate electrical apparatus, or such things as wireless valves and loud-speakers. Urgently required medicines and vaccines are also found frequently among air-borne parcels ; and because individual attention can be paid to each consignment, and for the reason that journeys which might otherwise occupy days are accomplished by air in a few hours, the sending of livestock by flying routes—such as day-old chicks, pedigree dogs, and animals for circuses and zoos—has been greatly on the increase during recent times.

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As for the way in which the flying mail is aiding modern commerce, it may often happen, nowadays, that some small but vital piece of machinery may need replacement in a mining-plant located somewhere far-distant along the Indian or African air-lines, and until that spare part can be obtained, and placed in position, the section of machinery involved may have to stand idle, and not only the machinery but perhaps a number of men as well. Here is a case in which time is money; and here, therefore, you have the value of the speed which the air-mail provides, because the additional cost involved by air express transport—and which is based on the

actual time-saving obtained—is very well worth while if it means, as it does, so many fewer days' idleness for some portion of a big plant. Again and again, in such circumstances, the air-mail proves a boon. Essential parts are ordered by cable, and sent out by air-mail, with such rapidity that prolonged idleness for vital pieces of machinery is obviated, the time-savings involved being in many cases a matter of weeks rather than of days.

Among the many instances that can now be adduced of the utility of the aerial mail, none could be more conclusive than one which transpired during the early stages of the African route. A party of motorists who were not far from the Juba station had a breakdown with their car which prevented them from continuing their journey until they could obtain a spare part from England. They cabled immediately to the manufacturers in this country who, in less than fifteen hours, managed to rush the part required up to London and on to the outgoing air-mail from Croydon. The result was one which amazed those marooned travellers, and gave them an illustration, which they will never forget, of what modern air-mail transport can accomplish. For, though they were 5,000 miles from London, and in a remote locality where, had it not been for the air-mail, they must have waited weeks for what they wanted, actually in not more than seven days from the dispatch of their cable to England the essential part they needed was handed to them at the Juba air-station by an official of Imperial Airways. In a letter received in London from one of the members of this party, he wrote: "It revolutionizes one's idea of time and of distance to be able to procure a vital spare part thousands of miles from England, and to receive this in the heart of Africa, only a week after the telegraphed request was made."

Motor-car manufacturers are now using the air-mail, whenever the time-factor is important, on a rapidly-increasing scale. Often, at the present time, a motorist on the continent will cable to London for some spare part for his car, and across this goes to him immediately in the next air express, frequently effecting a saving not merely of hours but of days. Packages dispatched by air-mail from Croydon at mid-day are delivered in Paris the same evening, while parcels collected in London at the close of business hours are flown across the Channel and delivered as soon as business houses open the following morning. Parcels dispatched from the provinces during the morning by the air-rail service already mentioned, and which arrive in London during the afternoon, are collected at the railway termini, taken immediately to Croydon, and flown to Paris on the evening service, being delivered the first thing the following morning.

Important industries are making a growing use of air-mail transport for the dispatch of samples of all kinds. Coffee planters in Kenya Colony are now able, for example, thanks to the African service, to get samples of their crops through to London in a matter of days rather than of weeks, while Egyptian cotton crop samples are also consigned to London by air-mail. Perishable goods of all kinds are included constantly in flying mail cargoes, mangoes and other tropical fruit now arriving in a fresh condition in London, thanks to the speed with which they are air-borne to England along the Empire routes. Not long ago, owing to the fact that Brussels sprouts are not normally available in Egypt in winter, some of the big hotels in Alexandria and Cairo conceived the idea of having a consignment sent out specially by the Indian mail-plane; and so, also, on another occasion, were a number of lobsters.

As a contrast to such odd loads, we should certainly not forget to mention that nearly all the bullion dispatched from London to the Continent is now air-borne. So picturesque, as well as practical, is this carriage of gold in bulk by air that it is a subject worth considering in some detail. The " bullion-plane ", passing high above land and sea, has in fact a romantic aspect which appeals to the imagination. Gold transport by air-mail is, as a matter of fact, now a purely business proposition, already favoured greatly by banking institutions. When urgent shipments have to be made between Governments or banks in Europe, the first thought is, as a rule, to earmark the consignment for air-mail dispatch. The advantages of so doing are considerable. Insurance rates, for one thing, are lessened greatly ; interest charges, for another, owing to the speed of air dispatch, are reduced ; while a number of incidental problems, affecting transport and shipment, are also solved. The whole operation, in fact, is simplified as well as expedited.

There are two main aspects of gold shipment by air-mail. One concerns the occasional transport of urgent loads, while the other is the possibility of carrying loads of gold, regularly, for long distances, between mines and centres of distribution. An occasional movement of gold by air, even in appreciable quantities, is already a perfectly satisfactory operation. A modern multi-engined mail-plane is capable of carrying 3 tons or more, and the use of several such machines enables a bulk shipment of an appreciable size to be made in a few hours between London and any destination on the continent. The gold usually takes the form of bars, packed in sealed boxes. Motor-vans transport it from the vaults in London to the air-port at Croydon. Here the mail-plane which has been chartered waits on the departure-platform. It is a simple and rapid

process to transfer the bullion to the air-liner's hold, and soon it is in flight to its destination at 100 miles an hour. Very large quantities of gold, representing in value many millions of pounds, have been air-borne from time to time between London and various destinations on the Continent; while shipments have also been made, as required, along the Imperial Airways' Empire routes.

It is the practicability of such occasional shipments which lends interest to the question, now being considered, of instituting regular gold transport by mail-plane between big producing mines and the centres to which bullion is consigned in bulk, and to which it travels at present by land or sea. Such projects would, obviously, entail the establishment of facilities which do not exist at present. The loads needing to be transported would be considerable, representing in some cases a good many tons each week. To deal with such bulk traffic regularly, and on an economic basis, would imply the use of large weight-carrying aircraft, adapted specially for their task. Such facilities might, in fact, develop into the use of a number of large aircraft, reserved specially for traffic to and from the mines, and carrying gold in one direction, and mining officials, stores, and other special cargo on return flights. An example of a system evolved on such lines is provided already in New Guinea. Here an air route operates regularly between the sea-coast and the mountain-mines at Wau. Ore is flown down to the coast, and mails, stores, and equipment carried on return flights. In this case a vital need exists for air transport, inasmuch as aircraft can accomplish, in less than an hour, a journey which by mountain roads or trails would occupy nearly a fortnight. The development of commercial aircraft, enabling larger loads to be carried for any given

horse-power, now renders increasingly practical the transport by air, in bulk, of cargoes in respect of which the time-factor is important, and there are no technical difficulties that cannot be overcome in carrying gold in bulk by air from, say, African mines to the European market. The problem is one of economics; of developing a service which is practical from a commercial point of view, not only to mining executives but also to air transport. Every day our air-mail services widen their scope. The transport of bullion by air has already found such favour that its logical development now appears to lie in bulk transport by aeroplane, on a systematic scale, between mines and the various countries to which gold is consigned.

The more one studies air-mail traffic in and out of Croydon, nowadays, the more interesting are the facts which emerge. We have, for example, already mentioned briefly the transport of livestock by mail-plane, and so important has this form of aerial traffic now become that Imperial Airways have just established a special department to deal with it. The existence of such a special department ensures not only that animals make their journeys in a minimum of time, but also that they receive individual care, being fed and attended to, as required, while in transit between London and any destination on the continent. When valuable animals are sent from this country to appear in Shows on the continent, it is essential not only that transit time should be cut down to a minimum, but also that vibration and jarring should, so far as possible, be avoided. In this respect the air-mail is, of course, unrivalled. Not only is an air journey smooth and free from those trans-shipments from train to boat, and back again to train, which are otherwise unavoidable, but animals travel in a lined compartment, well protected from draughts or

damp. A list of some of the recent livestock actually consigned by aerial mail is appended :—

Dogs	Bees
Cats	Turkeys
Mice	Insects
Day-old Chicks	Small bears
Pigeons	Lion cubs
Cage birds	Rare zoo specimens
Fish in tanks	Monkeys.

Not long ago all the poultry sent from one of the breeding districts on the continent to compete at a show in London was consigned by air-mail, the speed of the journey by air enabling the birds to remain two days longer at their home farm, before dispatch, than was the case with poultry forwarded by surface transport. Aircraft are often chartered to convey racing pigeons to some point on the continent, from which they are released for flights back to this country.

Recently, when a big mail-plane alighted at Croydon from the continent, the officials found that part of its interior had been transformed, temporarily, into a flying menagerie, containing parrots, monkeys, and a bear, together with a number of tropical fish in tanks. On another occasion the occupants of an incoming machine were a number of live alligators, travelling in special crates. In another case the officials were called upon to instal in a machine a den in which a fully-grown lion, accompanied by its trainer, was air-borne from the continent to London to take part in a circus. On yet another occasion a big craft had the interior of its hull arranged so that a valuable horse might be air-borne from abroad.

Consignments of day-old chicks, if placed on one of the early-morning mail-planes leaving Croydon, reach



Air-mail going aboard one of the big multi-engined air-liners at the Croydon air-port

in not more than a day's flying destinations far-distant across the Continent. Not long ago, for example, as many as 2,000 chicks, in a single consignment, were flown from this country to Roumania. Many travelling-boxes containing pedigree chicks have also been consigned by air-mail from this country to poultry farms in Russia. In such cases the chicks were flown from London to Cologne, where they were placed in another mail-plane bound for Berlin, after they went on by one of the night air-mails which fly to Moscow, via Konigsberg, reaching Moscow within 28 hours of leaving London. This meant that chicks hatched in England, and which do not require food for about 38 hours, actually had their first solid meal in Russia. Thanks to the speed of air-mail transport, and the care livestock receives while in transit by air, experience showed that at least 90 per cent. of these chicks were found to be alive and well when they were examined on reaching Moscow.

Another growing form of traffic is that of sending hatching eggs by air-mail. It has been proved, as a result of many shipments, that hatching eggs arrive in far better condition, when sent by air, than if they travelled by surface transport. The rise and fall of the aircraft hardly affects the eggs, while the absence of vibration means that there is practically no risk of displacement of the yolk. Eggs which usually show about 90 per cent. of successful hatchings on farms in England yield approximately 80 per cent. of successful results when hatched on the Continent after an aerial journey from this country. In addition to consignments from London to destinations on the Continent, hatching eggs are now being shipped for long distances on our Empire air-lines. Recently a number of consignments were forwarded from London to Kenya and Tanganyika

on the trans-African air route, the average of successful hatchings, after arriving at these destinations, being found to be in the neighbourhood of 60 or 70 per cent. Not long ago the air-mail from Africa brought a consignment of Penguin eggs from Cape Town to London for the authorities at the Zoo.

Another direction in which the speed of the air-mail has been able to play a valuable part lies in the war which science is waging against locusts, the insect pests which cause such widespread destruction. Experts at the War Office Chemical Department on Salisbury Plain have been studying methods by which locust swarms may be exterminated while on the wing, and in connection with these experiments, recently, it was desired to obtain as quickly as possible a considerable number of live locusts. To meet this demand the Government of Kenya shipped several crates of insects to London by air-mail. Only seven days after having been put on board a mail-plane at Nairobi these locusts were unloaded at the London air-port, and were sent immediately to the research laboratories on Salisbury Plain. Here it was found that, though a certain number had died on the journey, there were sufficient left alive to provide material for a number of important tests, during some of which the insects were placed in wind-tunnels and subjected to a spraying treatment with creosote, and also with sodium arsenite dust. The idea of the experiments is to discover improved methods for dealing with the locust plague in Africa, and more particularly to evolve methods wherby aeroplanes can attack locusts when they are on the wing and destroy them by releasing clouds of chemicals which are found to be most deadly in their effect. African administrations are collaborating actively in this new campaign, which is a matter of considerable importance to them, seeing that during

the past few years it is reckoned the damage caused by locusts has amounted to over £6,000,000.

In the whole of the operation of the flying mail, as now conducted with such speed and efficiency from our London air-port, no period of the year sees such a rush of traffic as that which comes just before Christmas, when tons of mails and parcels are air-borne from this country to destinations on the continent or along the Empire routes. Each Christmas, nowadays, sees a growing use of the aerial mail in the exchange of seasonable gifts and greetings between folks at home and those overseas. Not only is there an added touch of interest about letters or parcels which have been flown for thousands of miles in big aeroplanes or flying-boats, but there is the very practical advantage, from the sender's point of view, that owing to the speed of air dispatch one can post one's greetings so much later, if they go by air-mail, than would be the case if they were consigned by surface transport.

The aerial postman at Christmas carries more than his loads of air-borne letters. He becomes, in fact, a flying Santa Claus, because it is increasingly the habit of people in this country to send out parcels, as well as letters, by the swift means offered by the air-mail routes; and this applies particularly to that seasonable and ever-welcome gift, the Christmas plum-pudding. Last year, when one of the big mail-planes was being loaded up at Croydon prior to ascending on the first stage of a flight, it was found that plum-puddings figured so largely in its cargo that it was christened by some of the air-port officials " the plum-pudding air express ".

Those overseas who receive puddings and other gifts by air-mail are now beginning to reciprocate by consigning to relatives at home, as novel additions to the Christmas fare, rapidly-ripening tropical fruits which, owing to the slowness of surface transport, it has been

impossible to get to London in prime condition hitherto, but which now come right through, by air-mail, in only a few days after their dispatch from some station perhaps thousands of miles away. There is, it should also be mentioned, an air-mail marketing system now in existence which proves particularly useful, at Christmas-time, to those living near air-stations far out in the wilds. At all such stations special indexed catalogues are available, covering a wide range of articles obtainable from London; while as a part of the system order forms are also provided, and all that a purchaser has to do, after visiting an air-station and selecting some article from the catalogue, is to fill in such a form and dispatch it to London by the next home-going air-mail. When it reaches the metropolis, the order is executed so quickly that the packet or parcel is dispatched to its recipient by the next out-going air-mail; the result being that in a matter of days, rather than of weeks or months, goods can be ordered by air-mail from, and delivered to, remote outposts of Empire which are no longer isolated, thanks to the institution of the long-distance routes.

The rapid developments which are taking place with the flying mail, and the many inquiries now received as to the facilities it provides, have led Imperial Airways to establish a department to deal with such queries, and also to distribute information on this important subject; while the Post Office, in addition to its normal publicity arrangements, has been embarking recently upon a special campaign of advertising to attract fresh patrons for this time-saving convenience of the aerial post. The air-mail department of Imperial Airways is kept constantly busy, nowadays, giving advice and information about such matters as air-mail rates, latest times for posting, and times taken in transmission by air to all parts of the world.

TRAFFIC ON THE AIR-MAIL ROUTES

An important question which is now under discussion concerns the network of inland air-mail services which it is proposed should be instituted in this country, linking up at the London air-port with the air-mail routes operating to destinations throughout Europe and along the Empire routes. For an experimental period of three months, in 1930, Imperial Airways conducted an inland air-line from Birmingham, Manchester, and Liverpool to London, and this test provided data of considerable value. The results were indeed so encouraging that it was proposed, in the following year, to make this temporary service permanent, and also to extend its scope in various directions. Local authorities were eager to co-operate, and much might have been accomplished had not the whole country become involved in the general slump which soon paralyzed a new scheme such as this, and compelled those who had advocated it to wait till better times. Now, however, at the time of writing, with prospects becoming brighter again, plans are taking shape which should, before long, give us several thousand miles of inland air routes in this country, and, when such services are developed fully, and all the necessary organization has been perfected, they should afford valuable additions to our general air-mail facilities, providing not only special express services, between areas in this country where surface transport is still round-about and slow, but also ensuring swift connections from the provinces, via Croydon, with the big air-mail routes to the continent and beyond. It was argued, during the pioneer phase of air-mail development, that the climate of this country, and more particularly the existence during winter of conditions of bad visibility, would prejudice greatly the success of any inland routes; and this was true enough in a phase when operating experience was being gained,

and aircraft and ground organizations were still more or less experimental. To-day, however, as we have already indicated, things are very different. We have fourteen years of experience upon which to draw. A special ground organization for all-weather flying has been developed and brought to a high state of efficiency. Our air-mail pilots have an accumulation of flying experience. There are, furthermore, the fine multi-engined aircraft of the present day, which inspire such confidence, and which give their pilots the power to combat, and overcome, bad weather of a type which it would have seemed impossible to fly through not so long ago. All this being so, the technical problems of the inland air-line, as they present themselves to-day, are very much less formidable than was formerly the case. Naturally there would be occasions, as with surface transport, when conditions would render operations difficult; but there is no doubt at all now, even allowing for the occasional existence of such abnormal conditions, as to the ability of a highly-organized inland air-mail to provide ample factors of all-round dependability; and that such an inland system would be of extreme value, augmenting the facilities already provided between this country and the continent, and between England and India and Africa, goes almost without saying, more particularly when you reckon upon that general adoption of night-flying which is now so clearly indicated, and which is already an accomplished fact on many routes. The night air-mail, starting or arriving during the hours of darkness, is an established feature, for example, at our London air-port, where there is an admirably-devised system of lighting to aid pilots when they are flying by night. On the continent, too, and also along our Empire air-lines, special installations now facilitate the starting or finishing of flights during the hours of

darkness, while aerial lighthouses, throwing a penetrating beam skyward, guide the night air-mail as it speeds upon its way. Given a general system of night-flying, not only between London and the continent, but also on a system of inland air-mails, expedited services would become possible which would be of the highest value to the business world. Letters posted some time after the close of the business day throughout the provinces, in winter as well as in summer, could be flown up to Croydon, transferred there to night-flying craft for the continent, and could be delivered to their recipients next morning over wide areas of Europe. Similar accelerations, granted a widespread night-flying equipment, would be possible in the case of mails reaching this country from abroad. And the whole question, now, is simply one of enterprise. The air-mail has overcome, completely, its first limitations. To-day it is a proved, practical convenience, only awaiting development on broad, energetic lines. Certainly with regular night-flying there is no difficulty which organization cannot overcome. Aerodromes need to be well-lighted. Intermediate guiding beacons have to be provided. The wireless service must be highly efficient. Also, and this is of course important, aircraft have to be employed which are well-equipped for their purpose, facilitating navigation by night and regular night landings. But such matters, nowadays, are well within the scope of modern air technique, and all that is needed is a constructive policy of air-mail progress, in which private enterprise is reinforced by all the machinery of Government, and in which, also, the public encourage aerial progress by demanding that their correspondence shall, on the widest possible scale, be made to benefit by the accelerations which only air transport can provide.

Finally, in this chapter, as a prelude to a description of the development of Empire air-mails, it will be appropriate to outline briefly, from the latest data, the chief features of the network of the European system, as it exists and is in operation at the present time. Taking London as a starting-point, and dealing first with main routes extending north and north-east after they have crossed the Channel, one has that important line which, with stops at Rotterdam and Amsterdam, continues on to Copenhagen and northward as far as Oslo. Yet another line north-eastward takes the flying mail to Stockholm and from there to Helsingfors; while on beyond cities such as Brussels, Antwerp, and Cologne, comes that other long route which, after leaving Berlin, goes on to Danzig, Konigsberg, and Moscow, with a more northerly branch from Riga to Leningrad.

Another of the big trans-European routes is the one which, via, Prague, flies on to Vienna, Budapest, Belgrade, Bucharest, and Istanbul. Then one comes to the trunk lines which, from Paris, continue on south and south-east. One, for example, goes via Basle to Milan and Rome. Another, after flying southward to Lyons, continues on to Marseilles, where there are extensions across the Mediterranean to Tunis and Algiers. From Paris also, after a train link to Toulouse, go the first sections, via Barcelona, Tangier, and Casablanca, of the Atlantic air-mail to South America. And there are many other connecting links, on the ever-growing European network, with which we have not space to deal. If, as Kipling has told us, " Transportation is civilization ", then one of the most civilizing of all powers, at the present time, is the high-speed air-mail, operating not in opposition to, but in conjunction with, our other great methods of transport. And now for that vital subject, the Empire air-mail.



The arrival, at the London air-port, of the first air-mail from South Africa

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CHAPTER VIII

EMPIRE AIR-MAILS: THE ROUTE TO INDIA

Pioneer work by the R.A.F.—Blazing the air trail across Africa—The Cairo-Baghdad service—The air-mail through to India—Political and other problems—The route down the Persian Gulf—Machines, wireless, and land equipment

THE great Commonwealth of British nations, with territory widely spread throughout the entire inhabitable globe, presents obviously a suitable field for the operation of air-mail services, and immediately after the cessation of the Great War those in authority at the Air Ministry turned their thoughts to the problem of using this new form of communication, which the War had done so much to develop, for commercial as well as military purposes. With this object in view, the R.A.F. began the pioneer work of laying out an air route which would pass right through Africa from Cairo to Cape Town. The problems of operating such an air route were then unknown, but the experts of the Air Ministry courageously set to work, and early in 1919, only a few months after the Armistice, work was begun on the laying out of this route.

In order to accomplish the work in the shortest possible time, the route between Cairo and the Cape was divided into three sections. The first stretched from Cairo to Kisumu, on the shores of Lake Victoria in Central Africa—Kisumu being, at that time, known as Port Florence; the second section from Kisumu to

Abercorn, in Northern Rhodesia; and the third completed the route from Abercorn to Cape Town. This route, it will be noticed, passed almost entirely through territory which was British, or British mandated territory, and had the additional advantage of connecting up the two railway systems, one from Cairo southward along the Nile to Khartoum, and the other from Cape Town northward into Rhodesia which, as it were, formed a part of Cecil Rhodes' great plan for a trunk railway line from Cairo to the Cape.

The pioneers met with immense difficulties. They were faced not only by the wildness of Central Africa, and the torrid heat of the northern deserts, but also by lack of transport, and, in some cases, by the difficulty of obtaining suitable labour. After the projected route had been surveyed, and the most suitable situations for aerodromes discovered, it was found that in some localities the only suitable sites were in the heart of jungles or at the edges of vast swamps. Undismayed by difficulties, these air pioneers set to work and, with the help of native labour, aerodromes were literally cut out of forests, grass twelve feet high was cleared away; ant-hills which rose to a height as great as twenty-five feet were removed; and by March, 1920, the organization of the route was sufficiently far advanced to enable the first through flights to be attempted.

It was then found, however, that the difficulties with regard to these aerodromes were by no means over. The luxuriant vegetation grew at an alarming rate, and although the areas had been cleared, constant vigilance had to be maintained to prevent the cleared ground from reverting to its primitive state and becoming overrun again with vegetation. In addition, where ant-hills had been removed, it was found that the ground was undermined, and had to be consolidated to prevent

large holes appearing on the aerodrome; while the ants themselves pushed up fresh hills with alarming rapidity. It was, therefore, necessary to arrange with native chiefs to keep the aerodromes clear, although there was, as yet, no prospect of the route being used by regular air traffic.

With the completion of these trans-African aerodromes a number of pioneer flights, which had as their object the honour of being the first to fly from London to Cape Town, were organized; and in February, 1920, a Vickers "Commercial" 'plane—really a war-time bomber with minor adaptations to render it suitable for the then conception of a commercial aircraft—flew from London as far as Mwanza on the southern shores of Lake Victoria. This flight was supported by "The Times", and the machine had on board Sir P. Chalmers Mitchell, F.R.S., Secretary to the Zoological Society. In the following month Captain—now Sir Pierre—van Ryneveld, accompanied by Captain Brand, also in a Vickers "Commercial" biplane, flew from London to Johannesburg and, in taking off again to continue on to the Cape, wrecked their machine. Another air craft was, however, placed at their disposal, and in this they succeeded in reaching the Cape, thus being the first airmen to fly right through from London to Cape Town.

In spite of these pioneer flights throughout Africa, however, there was no further development for many years in the organization of regular services; in fact, although this route was the first to be organized from the point of view of the provision of a chain of aerodromes and landing-grounds, it was not the first to be regularly operated and, indeed, apart from casual flights, fell practically into disuse for some years. Meanwhile the R.A.F. were pioneering elsewhere, and in 1921 inaugurated a regular service for the carriage of mails and

supplies between Cairo and Baghdad. This service was originally designed to speed-up mail communications to the various units of the R.A.F. stationed in Iraq, but was so successful that it was eventually used to carry civilian mails. The route lay across a vast desert in which landmarks were practically non-existent, and, as in those days the art of aerial navigation was in its infancy, it was necessary to provide some form of ground guidance for the pilots. This was accomplished by ploughing a deep furrow for hundreds of miles across the desert. This stood out in the wastes of sand, and formed an easily-distinguished track above which the pilots of this pioneer Empire air-mail flew. Although this service was intended officially only for the carriage of mails, dispatches, and urgently-required R.A.F. stores, the pilots took the opportunity of attempting to obtain for the various R.A.F. messes in Iraq some of the amenities which their geographical situation denied them. For instance, it was almost impossible to obtain certain kinds of fish in Baghdad as, owing to the intense heat, it became uneatable in a few hours, and ordinary transport from the sea to Baghdad occupied several days. Some of the air-mail pilots, therefore, attempted to remedy this deficiency, at any rate as far as their own messes were concerned, and before leaving Cairo in the early morning purchased supplies of fish which they were assured had only been caught an hour or so previously. Stowing these carefully away in the body of the big bombing 'planes which were used for this mail service, they set out through the heat across the desert to Baghdad. Long before Baghdad was reached, however, the smell of rotting fish became unbearable, and their precious cargo had to be heaved overboard. Later attempts, with fish packed in ice, were, however, more successful.

While the R.A.F. were pioneering in this work of connecting the Empire by air, the commercial airways which had come into existence shortly after the Armistice, and which were operating cross-Channel routes connecting London with some of the nearer capitals on the Continent, were passing through phases which were certainly not conducive to any attempt to establish regular Empire air services. It had been definitely established that air services could not be operated, on any normal commercial scale, with the equipment and flying stock then available, or, in fact, then contemplated, and that some form of Government assistance was essential. This assistance had been given, but a suitable method for its distribution was hard to find; and a lack of policy in this direction had resulted in the somewhat chaotic development of a number of competing air transport companies, all cutting one another's throats. An attempt had been made to eliminate this competition by allocating separate routes to each Company, and subsidizing them in accordance with the different characteristics of the routes chosen. These Government subsidies, however, were for short terms only, and it was felt that before any Empire development could take place it would be necessary for the operating air-lines to have a much greater security of tenure, and a guarantee that their subsidies should extend over a sufficient number of years to enable them to overcome the initial pioneering difficulties inseparable from the institution of a new venture.

With this object an amalgamation of the existing British air transport companies into one national operating company, which should have the support of the Government for a definite number of years, was planned and brought into effect, and on April 1st, 1924, Imperial Airways began operations on a national basis. We

have already referred briefly to this landmark in British aviation; and, as its title implies, the principal object of the Company was to establish and operate airways on an Imperial scale, and negotiations were immediately begun for the establishment of an air-mail service which would connect Britain with India.

Although the geographical position of Great Britain, as a group of islands to the west of Europe, has made us a seafaring nation, and has had great influence in the building up of the British Commonwealth of Nations, this geographical position is not only not helpful, but definitely unfavourable, when it comes to a question of operating air services to the various parts of the Empire. To the west lie 2,000 miles of the Atlantic ocean, while to the south and east the Continent of Europe acts as a barrier between us and the other countries of the Empire. In order to reach them by air it is necessary to fly over foreign territory; and even when it was considered that our knowledge of air service operation, and our personnel and flying stock, were sufficient for the bold venture of Empire air services, the political question began to loom largely on the horizon; and it was this, and not the operational side of the problem, which delayed the start of the London-India service.

By the autumn of 1926 Imperial Airways had completed their preparations for the start of the first section of the London-India service, that stretching from Cairo to Karachi, but difficulties with regard to the operation of this service along the Persian shores of the Persian Gulf held up the project, and it was not until 1929 that these difficulties were overcome. Meanwhile, in January, 1927, Imperial Airways had taken over the Cairo-Baghdad air-mail service from the R.A.F., and had extended it to Basra at the head of the Persian Gulf. A special fleet of 3-engined air-liners had been constructed

for operating this route, and, with the object of putting it on a permanent basis, a complete ground service was organized.

We have so far referred to these Empire services only as *air-mail* services, but it was early decided that the carriage of air-mails alone, under the terms offered by the Post Office, would not justify the expense of operating such routes, and therefore the whole scheme was developed from the point of view of carrying mixed loads, which would consist not only of mails but also of passengers and urgent freight. The inclusion of passengers, in the loads to be carried along the Empire air-routes, had several far-reaching effects. The type of aircraft available in 1927, which then represented the last word in aircraft construction, did not provide the comfort, and freedom from noise, which is attained to-day; while there was a definite limit to the amount of flying which passengers could be expected to do in any one day. This had the effect of limiting the daily stages, and also of eliminating, for the time being at any rate, all question of flying by night. Air-mails and freight require no comfort, nor is it necessary to provide them with so many cubic feet of space over and above their own bulk; nor do they require seats; but passengers however—especially when travelling for many hours a day—must have the largest possible amount of space, and also the greatest available comfort. This meant that the primary requirements, in the machines which were to operate these Empire services, were dictated by the need for carrying passengers; and the provision of the largest possible cabin space had the effect of limiting the speed of the aircraft, a compromise having to be made between speed and comfort in regard to the engine power employed. A further result of the decision to carry passengers was the necessity for an

elaborate ground organization which would minister to the well-being and comfort of travellers while they were on the ground between the various flight stages, and Imperial Airways decided to establish this organization on a permanent basis. The necessity for dividing the route into, as near as possible, equal daily stages meant that meals and sleeping accommodation had to be provided at some points where no such accommodation was in existence, and to meet this deficiency rest-houses were built, some of them being in the heart of wild or desert country. In one instance, in fact, a rest-house had actually to be built in the shape of a fort in the heart of the desert, owing to the hostile nomad tribes encountered in that district.

For this first section of the Empire air route, from Cairo to Basra, a complete ground organization, which could deal not only with the requirements for ensuring the regularity of the service, but which could also minister to the comforts of passengers, was established, the principal stopping places between Cairo and Basra being at Gaza in Palestine, at Rutbah Wells in the Iraq desert, and at Baghdad. The operation of this first Empire air route presented, however, difficulties other than those of ground organization. The territory over which the route passed was sparsely populated and totally lacking, except at widely distant points, in the ordinary amenities available in populous areas. Although, therefore, every endeavour had been made, when the aircraft for operating this service were designed, to eliminate risk of forced landing, chiefly by the provision of three engines to each machine, it was also necessary to provide special arrangements which would ensure that no harm should come either to passengers or mails in the event of a forced landing in this wild and inhospitable country. The first essential was, obviously,



In the photograph above—a typical scene at the London air-port—passengers are seen entering one of the four-engined air-liners of Imperial Airways, for a flight to Paris, which is now accomplished in two and a quarter hours

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the provision of some means of communication with the ground stations in the event of an air-liner having to alight away from the recognized points of call. Communication by wireless telephone had, by this time, been developed on the cross-Channel routes to a point of range and reliability which was quite satisfactory whilst an aircraft was in the air, and by the use of telegraphy instead of telephony the range and reliability could be, and was, still further improved. The aerials which had up to this time been fitted to aircraft were, however, of the type known as " trailing ". This type of aerial consisted simply of a weight on the end of a length of stranded copper wire wound on a reel. Once the aircraft was in the air this wire could be lowered through the floor beneath the pilot's cockpit and allowed to trail out below the aircraft. This, obviously, could not be used when the aircraft was on the ground. Furthermore, the power for operating the wireless transmitting set was obtained from a wind-driven dynamo, actuated by the air-liner's passage through the air, and which ceased of course to operate when the aircraft was at rest. It became necessary, therefore, to devise a new aircraft wireless apparatus, which would enable an aircraft on the ground both to receive and transmit wireless messages. Already a device for starting the aircraft's engines mechanically had been introduced. This consisted of a small, independent petrol motor, operating an air compressor, and connected in such a way that the compressed air could be used to start each of the main engines in turn. It was, therefore, decided to use this small air compressor, or gas-starter, to run an emergency dynamo which would supply power to the wireless transmitting set when the aircraft was on the ground ; while in these first Empire-type machines the aerial difficulty was solved by using a

telescopic mast which could be erected in the event of a forced landing. The provision of these two additions to the aircraft equipment resulted in the crew of the machine being able to communicate with the nearest air-station, no matter whether they were in the air or on the ground.

This, however, was not the only provision necessary for the comfort and safety of passengers, as even though the crew of a stranded air-liner could communicate their approximate position to rescuing aircraft, it was by no means easy to locate one solitary air-liner in an area of featureless desert, extending for hundreds of miles in all directions; and it was quite within the bounds of possibility, therefore, that a considerable period might elapse before the stranded machine was found and succour became available. This being so, each aircraft was, before starting on a flight across the desert, equipped with "iron" rations and drinking water sufficient to last both passengers and crew for several days.

The mention of such details of equipment is necessary to show how thoroughly the organization of this first Empire air route was carried out, and how every eventuality was foreseen and arranged for. This is all the more striking, too, when one learns that on only two or three occasions has the necessity for the use of either the special wireless equipment or the "iron" rations arisen in the six years of operation since the trans-desert air service was inaugurated; in fact, even during its first year, this desert air-mail flew with an efficiency of one hundred per cent.

Meanwhile negotiations were being continued for the extension of this service along the shores of Persia to India. Negotiations with Persia dragged on, and at one time broke down altogether; but in 1929 the difficulties were overcome, and the Persian Government

granted an authorization to Imperial Airways to fly once weekly in each direction for a period of three years along the Persian coast. Negotiations had also been in progress for the extension of the service from Cairo to London, and these had a successful issue at approximately the same period; so it became possible to extend the service eastward from Basra to India, and westward from Cairo to London simultaneously, thus providing a 5,000 miles air service connecting Britain, Egypt, Palestine, Iraq, and India—this being the first regular air service from Britain to any part of the Empire.

The whole of this Empire service, with the exception of two short train links—one from Basle, in Switzerland, to Genoa in Italy, and the other from Alexandria to Cairo—was accomplished by air. Air-liners flew from London via Paris to Basle, specially-designed flying-boats from Genoa, via Rome and Athens, to Alexandria in Egypt; while the Empire type air-liners already referred to operated the remainder of the route from Cairo, via Baghdad and Basra, to Karachi in India. The train sector between Basle and Genoa was rendered necessary by political difficulties with Italy, who would not allow British aircraft to enter Italy via France; while the Alps were a barrier for regular air operations between Switzerland and Italy. The second train sector between Alexandria and Cairo was rendered necessary by lack of aerodrome facilities at Alexandria, and passengers and mails had thus to travel by train from the flying-boat terminus at Alexandria to the air-liner terminus at Cairo.

This first Empire air service operated satisfactorily for nearly a year, and brought India within seven days of London, this saving of time enabling letters to be sent to India, and a reply obtained, in approximately

the time taken for a letter to make the single journey to India from London by surface transport. This saving naturally attracted an increasing volume of mail traffic, which grew until something like half a ton of air-mail, or approximately 40,000 letters, were air-borne in each direction weekly between Britain and India.

After nearly a year's operation, however, further political trouble developed with Italy, and it became necessary at short notice to divert the route so that it did not touch Italian territory. An air-line was, therefore, planned through Central Europe, operated by land-planes running via Vienna and Budapest to Salonica, where the flying-boats took over the service and operated via Athens to Alexandria. Although this route across Central Europe was satisfactory during the summer, weather conditions rendered it extremely difficult during the winter. The mountain area between Skoplje and Salonica is one of the worst in Europe from a flying point of view, while, to make matters worse, there was a lack of meteorology, wireless, and night-flying facilities, and, being foreign territory, these could not be readily established. This meant that flying had to be confined to day-light hours, and in winter, when these were short, mails and passengers were sent by a convenient night train over that sector. This Central European route was followed for eighteen months, when the political difficulties with Italy were overcome, and in May, 1931, Imperial Airways returned to the Genoa-Naples-Corfu route. The agreement with Italy was, however, only for one year's duration, after which Italy insisted that the route should be operated from Milan to Brindisi by land-planes. This proposed new route, however, was another cause for anxiety namely, that the winter weather around Milan is particularly bad, and that, in any case, land-planes operating the

Milan-Brindisi section would be flying uneconomically, and increasing the cost of the service. These difficulties led to an investigation of all the possible combinations of rail and air services between London and Brindisi, and this inquiry showed that, in the particular circumstances, many practical advantages might be gained by using the train, instead of flying, between Milan and Brindisi. The expenditure which would otherwise have been incurred, by using land-planes between Milan and Brindisi, could for example be allocated towards the cost of operating a second service each week from Brindisi across the Mediterranean, thus providing two fast services a week instead of one to the far side of the Mediterranean; and so it was ultimately decided that, so far as the crossing of Europe was concerned, the section from Paris to Brindisi should be operated throughout by train.

Simultaneously with this new arrangement for the crossing of Europe, a shortening of the route was contemplated by omitting the detour to Egypt, and arrangements were made, and carried into effect, for the route eastward from Athens to run via Tiberias, on the Sea of Galilee, and from thence straight across the desert to Baghdad. In actual practice this meant that the flying-boats on the Mediterranean section flew inland over Palestine and actually alighted on the Sea of Galilee, which is several hundred feet below sea level. Passengers and mails were there transferred to an adjoining aerodrome at Semakh, where they were placed on board land-planes for the continuation of their journey eastward. On the west-bound services, of course, this procedure was reversed. In order to connect this service with Egypt, a short link service was inaugurated from the Sea of Galilee to Cairo. This shortening of the route enabled a day to be saved on the time of transit between

London and Karachi, and a six-day schedule was put into operation.

Meanwhile the agreement with Persia expired, and was renewed for short periods only, while the alternative route along which the Persians wished the air service to travel, while flying over their country, was being surveyed and investigated. This was an inland route, and although it served some of the most important towns in Persia, the country between these towns consisted of high, snow-covered mountains, with precipitous gorges upon which no satisfactory sites for emergency alighting-grounds could be located; while the area was utterly devoid of wireless and weather services. In addition, the existing aerodromes were of such a nature that it was impossible to use them throughout the year, as they became badly affected by varying weather conditions. In fact, the whole route was most unattractive, and would have been extremely costly to organize, and very difficult to operate regularly on an all-the-year-round basis. It was, therefore, decided to investigate the possibilities of a route along the southern coast of the Persian Gulf, thus avoiding Persia altogether. The Arabian coast route, to which we have already referred, and which runs from Basra via Koweit, Bahrein, and Sharjah, passing from there along the Persian Coast, outside territorial waters, to Baluchistan and India, had many practical points to recommend it. Being a coast route, the difficulties and cost of obtaining supplies of fuel were comparatively easy to overcome, as shipping was available. There were already wireless services, not only on the shores of the Gulf, but also the steamers in the Gulf could be communicated with by wireless telegraphy if necessary. Apart from one range of mountains, in the Oman Peninsular, the country was low-lying, while flying along a coast route was obviously

more comfortable than over mountainous inland regions, and weather conditions were also more likely to be suitable on a coastal than on an inland route. But even in the case of this Arabian route political difficulties had to be contended with. The Sheiks ruling territories along the coast are closely allied to Britain by tradition and custom, and thus the air route is, in effect, under British protection, but though these Sheiks are progressive, and recognize the value of modern methods of transport, and the trade they bring, they are still bound to a large extent by the traditions, customs, and religious beliefs of their tribes. When it is mentioned that inhabitants of one place refused to allow the use of a motor-lorry because motor-lorries are not mentioned in the Koran, it can be seen that opposition to the establishment of an air service was to be expected.

This Arabian coast route was originally intended for flying-boats, and was actually surveyed by flying-boats of the R.A.F., who chose various points where flying-boat bases could be established; but here again unexpected opposition was encountered. At one place on the Gulf the local Sheik, while prepared to allow the use of his territory to R.A.F. machines, was not prepared to agree to a civil service passing through, and staying the night, in his territory. Another Sheik, realizing that an air service would bring more trade, needing provisions and fuel, and would bring him a considerable income in the form of rent and landing fees, decided to allow a base to be established in his territory. Unfortunately, however, he became ill and, changing his mind, declined to have anything further to do with the proposition.

During the course of the survey, in which Imperial Airways officials joined, it became evident that the route could be operated just as well by land-planes as

by flying-boats, and as land-planes were already in use on the old route, and fresh flying stock would have been needed had it been decided to use flying-boats, it was eventually decided to establish the service as a "land" route; and, final difficulties having been overcome, aerodromes were established at Bahrein and Sharjah, with emergency alighting-grounds at various other points, and in October, 1932, the Persian coast route was abandoned and the new Arabian coast route brought into operation.

From the very commencement of the Empire air service from London to India, the ultimate object had been to extend the route across India from Karachi and onwards towards Australia; but difficulties in India delayed this extension for years. A temporary extension from Karachi was operated for some time to Delhi, the machines operating the section between Karachi and Delhi being chartered by the Indian Government. This extension terminated in December, 1932, and arrangements were made by the Indian Government for light 'planes belonging to the Delhi Aero Club to connect with the mail-planes at Karachi and carry mails between Karachi and Delhi. A big commercial firm in India also inaugurated a service of light 'planes which connected with the England-India mail at Karachi, and operated a mail service from there on to Bombay and Madras.

In the early part of 1933 the difficulties in India were finally smoothed out and an Indian company—India Trans-Continental Airways—was formed to operate air-mail services across India. The capital of this Company was subscribed by Imperial Airways, the Government of India, and an Indian transport company, and on July 7th, 1933, the air-mail service was extended from Karachi via Jodhpur, Delhi, and Cawnpore to



An air-liner, outward-bound, passing the control-tower at the London air-port

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Calcutta, while further extensions to Rangoon and Singapore were organized in readiness for their opening later in the year.

To complete, as far as possible at time of writing, this history of the first Empire air route and its subsequent extensions, it should of course be mentioned that negotiations for further extensions onward from Singapore to Australia, thus providing a through air-mail route from Britain to Australia—which will be the longest route of its kind in the world—are now proceeding actively. A company has been formed in Australia, and has amalgamated with one of the principal Australian air transport companies, with the object of tendering to the Australian Government for the operation of the route between Singapore and Port Darwin. It is expected that before the end of 1934 this great England-Australia air-mail route will be in full operation.

CHAPTER IX

THE AIRWAY ACROSS AFRICA

First experimental commercial flights—The Cobham-Blackburn tests—The agreement with Imperial Airways—Work of local administrations—The route described—Flying-boats and land-planes—Operating problems—Wireless equipment—The "homing" system—Crews of the Empire 'planes

DURING the period of the development of the India air-mail route, the pioneer work in Africa had not been forgotten, and various attempts were made to come to some agreement as to the operation of a trans-African air-mail. Eight years elapsed, however, after Sir Pierre van Ryneveld's pioneer flight, before commercial enterprise entered the field; but in 1927 a series of experimental flights was conducted between Khartoum in the Sudan, and Kisumu in Kenya Colony, by an off-shoot of the Blackburn Aeroplane Company under the command of Captain T. A. Gladstone. Further demonstration flights were made on this section, during the following year, by Sir Alan Cobham, who used a large flying-boat, and the interests of these pioneers were combined under the title of the Cobham-Blackburn Air Lines; while, in the same year, an air transport company—Wilson Air Lines—began developing air-taxi services in Kenya.

Imperial Airways had, by this time, gained considerable knowledge and experience in the operation of their England-India route, and the British Government was anxious to combine this operating experience with

the local knowledge obtained by the Cobham-Blackburn Company, and, with this end in view, Imperial Airways acquired in 1930 the whole of the interests of the Cobham-Blackburn Company. Negotiations had also been proceeding between the British Government and the Governments of the Union of South Africa, the Sudan, Uganda, Kenya, Tanganyika Territory and Northern and Southern Rhodesia, for a combined arrangement which would lead to the establishment of a trans-African air route, and it speaks volumes for the air-mindedness and courage of these various Governments that, in spite of the condition of world affairs prevailing at that time, they did all agree to combine, each contributing their share to supporting such a service, not only financially, but also by providing the necessary ground organization and weather and wireless services. This co-operation led to the concluding of an agreement between Imperial Airways and the British Government—acting also on behalf of the Dominion and Colonial Governments *en route*—for the operation of a weekly London-Cape Town air service for passengers and mails. It should be noted, here, that the route as at present operated is not the most direct route between London and Cape Town. Several record-breaking flights have been made between London and the Cape, following as closely as possible a direct line taking them across the Sahara, over the Congo jungles, and across the desert regions of south-west Africa—districts which, for thousands of miles, are sparsely populated and devoid at present of commercial activity. On the east of Africa, however, lies vastly different territories which, in many parts, have already been developed commercially. It is interesting to examine the existing transport systems over the territories which the air route follows. There is, of course, the railway which runs south from Cairo,

following approximately the course of the Nile, to Khartoum, with an offshoot to Port Sudan, and the railway running north from Cape Town to Elizabethville in the Belgian Congo. The only other railways run from points of commercial development in the interior to the nearest point on the coast and are, for the main part, entirely unconnected with any general system. This means that, in order to travel from one important town in the interior to another, it is either necessary to travel through bush, jungle or desert by more or less primitive methods of transport, occupying days and weeks, or to make long detours down the railway to the coast, by steamer to the coastal terminus of the next railway, and then back into the interior again by rail.

It was with a detailed plan in view of all existing communications, and of areas of population and commercial development, that the trans-African air route was planned. During the winter of 1929-30, and the spring of 1930, a technical mission, representing Imperial Airways and the British Air Ministry, went over the route to make the final arrangements for the ground organization with the various Governments. It was finally decided that the route should follow approximately the course of the Nile from Cairo, via Assuan and Wadi Halfa to Khartoum, and through the centre of the Sudan to Juba. So far this route, for all practical purposes, runs due north and south, but from Juba the course changes east, in order to reach Kisumu on Lake Victoria, and Nairobi the capital of Kenya Colony. At Nairobi a change is again made, and the route continues in a south-westerly direction into Tanganyika, and on to Broken Hill in Northern Rhodesia. Here again is a sharp change to the east, to connect Salisbury, and then back west to Bulawayo, after which Johannesburg and Kimberley are passed *en route* for Cape Town. This

foes. Rich gold was struck a few years ago at Wau, in this wonderful territory; but the goldfields lay far back from the coast, with the intervening forests and mountains proving an almost insuperable barrier. Of roads there were none—nothing, in fact, save native trails, and these twisted up perilously through the jungle. It took more than a fortnight, in fact, for native bearers to carry a few pounds of stores from the coast to these mountain-mines, and, rich though the yield of ore promised to be, the problem seemed hopeless until, in a flash of inspiration, someone suggested an aeroplane. No sooner said than done. A landing-ground was cleared at the sea-coast, and another away up in the mountains. Then a machine was brought from Australia; and one morning it soared swiftly above mountains and forests, and effected in less than an hour, with effortless ease, a toilsome, dangerous journey which had previously been occupying more than fourteen days!

The miners away up in their lonely clearing, hedged in by the unyielding forest, cheered when that 'plane came gliding down. And no wonder, because they saw that their problem was solved—as, indeed, it was. More aeroplanes were obtained; bigger machines carrying heavier loads—regular "flying lorries". An airway was established between the sea-coast and these distant mines, the aircraft becoming the only regular link with civilization, and loads amounting to thousands of tons being air-borne to and fro. Even a small hotel, arranged cunningly in sections, has gone up by this magic "sky-way" to the settlement far above; to say nothing of pianos, billiard-tables, and such-like amenities. And the natives peer up in awe, from their forest glades, at the coming and going of "the great white birds".

arranged so that passengers can be accommodated for the night in existing hotels, taking their meals *en route* from luncheon baskets. This system is obviously only possible where the amenities of civilization already exist at convenient intervals.

The other method is to operate a service with relays of aircraft and crews, adopting different types of aircraft to meet local conditions. This necessarily means a ground organization which is more or less elaborate—at any rate at the various points where the change-over from one type of aircraft to another takes place. The first system mentioned has the great disadvantage that, should a breakdown occur which it is beyond the skill and means of the crew to remedy, then the service of necessity breaks down, as the nearest relief aircraft may be thousands of miles away. With the relay system, however, this difficulty is overcome, because obviously there are aircraft stationed at various points along the route in readiness to carry on the service, and these can be used to relieve any machine which should break down. Our British Company decided from the outset to operate the relay system, and to use aircraft of different types, each one suitable for the territory over which it was to fly. In the operation of London-Continental routes, the only water which had to be flown over is the narrow strip of between twenty and thirty miles of the English Channel at its narrowest point; and this has, from the beginning, been flown over with land-planes. One or two of the earlier types of 'plane—having only one or, at the most, two engines—were compelled by mechanical trouble to descend in the Channel; and it was with the object of overcoming this, and also of providing greater reliability, that triple-engined machines were introduced which could continue their journeys, at any rate to the nearest emergency alighting point, with any one of their

three engines out of action. On Empire routes there was the wide stretch of the Mediterranean to be traversed, with a minimum sea crossing of something like 400 miles, and it was decided from the outset that this section should be operated by a type of marine aircraft able to ascend from or alight on water. Small craft of this type had already been built in Great Britain, and larger craft had been constructed for military purposes, but there was in existence no British flying-boat or sea-plane which could carry a really commercial load of passengers. The first consideration, therefore, when the operation of Empire routes was contemplated, was the designing and building of a fleet of flying-boats capable of carrying not only mails and freight but also passengers, and these last named to be afforded the greatest possible comfort. Therefore the technical experts of Imperial Airways set to work, in co-operation with Messrs Short of Rochester, who drew up a specification of the flying-boat required, bearing in mind the types of weather which would be encountered in the Mediterranean, and the estimated volume of traffic to be expected.

Hitherto the greatest drawback in the flying-boat had been the construction of its hull of wood, which soaked up water, with a consequent increase in weight and loss of pay-load. Experiments had, however, been proceeding with the construction of hulls built entirely of metal, which were obviously free from this defect, and it was found possible to build flying-boats with all-metal hulls—using an alloy of aluminium which was, in fact, actually stronger and lighter than hulls constructed of wood. These metal hulls suffered at first, however, from the corrosive action of sea water, but eventually, through research by Air Ministry and other experts, a method of treating the hulls was devised which overcame this defect.

A fleet of three-engined flying-boats with all-metal hulls was constructed for operating the Mediterranean section of the Empire routes. They were, at the time they were built, the most luxuriously equipped heavier-than-air craft which had so far been constructed. Their cabins were large and spacious, with seats for fifteen passengers, and there was also accommodation for a crew of four. Engines of 3,500 horse power drove these machines at a maximum speed of nearly 130 miles an hour, and they were completely equipped with a buffet, from which a steward served light meals during flight; and they had, in addition to passenger accommodation, a mail compartment in which approximately a ton of mails could be accommodated. These flying-boats operating in the Mediterranean were moored out in all weathers, and in actual practice were only taken out of the water when it became necessary to give them extensive overhauls.

For the land sections of our first Empire air services special Empire type air-liners were built to operate across the Iraq desert and along the Persian Gulf to India. These machines, although of approximately the same engine power as the flying-boats, had to operate in a tropical heat which rendered the problem of taking off more difficult; and they were, therefore, unable to carry as heavy a load as the flying-boats; while although their maximum speed was approximately equivalent to that of the flying-boats, they had accommodation for eight passengers only, in addition to mail and freight. On the European land sections of the Empire routes no special type of aircraft was needed, the machines normally used on the cross-Channel routes being employed, as required, on the Empire services.

With equipment as described, the first service between London and India was operated successfully;



One of the four-engined British air-liners, which carry thirty-eight passengers, in addition to mails, freight, and a crew of four

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but with the growing loads of mail, and the increasing demand for passenger accommodation, it was evident at an early stage that either a more frequent service would have to be run, or larger craft provided. As the agreement with the Persian Government limited the service through Persia to one machine in each direction weekly, and as it was obviously more economic to operate one large machine than a number of small ones, it was decided to construct new fleets of land-planes and flying-boats which would be able to deal with a much greater volume of traffic. The traffic needs on the cross-Channel services were also demanding larger 'planes, and so the construction was commenced of a fleet of big air-liners, each having four engines and being of a size greater than had been attempted hitherto in any other part of the world.

With the requirements of both the European and the Empire services in mind, two types of these new air-liners similar externally but differing internally, were decided upon; and brief references to them have already been made in a previous chapter. For use in Europe the new craft had two cabins, capable of accommodating, between them, thirty-eight passengers; while in addition a kitchen, from which full-course meals could be served by stewards during a flight, was incorporated. The cabins themselves were placed fore and aft, the space in the centre of the aircraft being used for luggage-holds, mail-compartments, lavatories, and kitchens. The four engines were placed on the wings as far away from the body of the 'plane as possible, with the result that the cabins were infinitely quieter than in any machine used before. This quietness was still further enhanced by the use of layers of sound-insulating material in the cabin walls. The final result of these innovations was to produce a large air-liner—the cabins being approximately

the size of a railway Pullman car—which gave a standard of comfort equivalent to that of first-class surface travel. In machines of this type for the Empire routes, slightly more room was provided for the storage of mails, and the seating accommodation was reduced to twenty. This allowed the provision of a larger amount of space for each passenger, thus making for greater comfort, and the introduction of these big new luxury craft had an enormous effect in stimulating Empire air travel.

Simultaneously with the construction of these new land-planes, a new fleet of flying-boats was also built—as mentioned briefly in Chapter V. These, again, were much larger than the original Empire flying-boats, and their hulls, to just above the water-line, were constructed entirely of stainless steel, an innovation made possible by researches which had resulted in the production of very thin sheets of stainless steel which combined lightness with great strength. The arrangement of the four engines, in line along the top wing, contributed largely towards a reduction of noise.

The completion of negotiations for operating the trans-African route from Cairo to Cape Town brought to the front new operational problems. The geographic and climatic conditions, along this 5,500 miles route, were entirely different from those encountered on the India air-mail. In the north of Africa, desert conditions prevailed, these presenting no new problem; but from Khartoum to Kisumu on Lake Victoria, in the centre of Africa, stretched a vast territory of Sudd or swamp, in which there existed very few areas on which aerodromes —not subject to flooding—could be constructed. In addition, the ground rose steadily, Lake Victoria itself being some 4,000 feet above sea level. Through this great swamp area the Nile and its tributaries wound their way, forming natural alighting grounds for flying-boats

and it was, therefore, evident that at any rate in the early stages this section could most conveniently be operated by flying-boats. As, by this time, the new big four-engined flying-boats previously mentioned had been completed for operating on Mediterranean sections, the original three-engined flying-boats were transferred from the Mediterranean to this Central Africa swamp area; while the introduction of the new four-engined air-liners on the India route enabled the original Empire type 'planes to be transferred from the India to the Africa route. The air-mail from Cairo to Cape Town was thus operated by land-planes from Cairo to Khartoum, by flying-boat from Khartoum to Kisumu, and again by land-planes from Kisumu on to the Cape.

This arrangement, though necessary in order that the service should be started at the earliest possible moment, was obviously not ideal. The operation of different types of craft meant a duplication of spares, and also the duplication of skilled personnel, as each type required its own specialized engineers. In addition, the craft themselves had not been built originally for the peculiar conditions met with on the Africa route. South of Kisumu, for instance, the ground over which the route passed was, practically everywhere, at a height of from 4,000 to 5,000 feet above sea level, and the thinness of the air at these heights, added to the heat of tropical Africa, reduced considerably the loads which could be carried.

Such problems had already been foreseen, and, as soon as the agreements for the operation of the route were signed, the construction of a special fleet of aircraft, designed with these geographic and climatic conditions in mind, was put in hand. This fleet represented an entirely new development in British commercial aircraft design. They were, for example, monoplanes, whereas

all previous machines in the Imperial Airways fleet had been of biplane construction. Their engines were supercharged in order to render them efficient on high-altitude aerodromes, and their cabins were constructed in order to give the greatest possible cubic capacity for each passenger. They were also the fastest commercial air liners of the Imperial Airways' fleet, being capable of a top speed of 150 miles an hour, and, following the policy adopted with new craft of a large type, each had four engines.

It had been the intention to operate the service right through from Cairo to Cape Town with this fleet of monoplane air-liners, but even before they came into service the traffic on the northern half of the route had grown to such an extent that it became necessary to modify these plans and to use the large new twenty-passenger biplanes for this section, operating the southern section only with the monoplanes. This modification affords a striking example of the flexibility of a large airway organization, and is a powerful argument for the unified control of Empire air services, as with one central system of control the necessary machines and personnel can be switched over from one portion of the routes to another, just as traffic demands.

The first result of the introduction of the new types of aircraft was to reduce the original time of eleven days, occupied in the flight from London to Cape Town, to not more than ten days, and although at the time of writing the new monoplanes have only been in service for a few months, further speeding up is already contemplated.

The development and improvement in the main design of the aircraft, as used for Empire routes, was accompanied also by a similar development in the various accessories and aids to navigation. In actual experience,

in the early stages of the African route, it was found that, excellent as was the wireless equipment in use on the European routes, it was not entirely suitable for the Africa service, due chiefly to the frequent and violent electrical storms encountered in the Equatorial regions of the route, which interrupted wireless communication and, in fact, on occasions, rendered direction-finding apparatus not only useless but actually misleading.

It was therefore decided that the Marconi Company, in co-operation with the Air Ministry and Imperial Airways, should carry out a special wireless survey of the Africa route in order to ascertain what were the principal problems to be encountered, and to gain experience which would enable the difficulties to be overcome. This wireless survey occupied a period of six months, during which time the Marconi Company carried out an extensive series of tests with long and short wave wireless communication from the air, flying over the route in aircraft specially fitted with experimental apparatus. The immediate result of this wireless survey was the development of a completely new aircraft wireless equipment, which is capable of communicating either on the medium wave-lengths usually employed for ground and air contact, or on short waves. It was the introduction of the short waves which solved the problem of atmospheric interference. Careful experiments carried out under practical working conditions—and since confirmed in actual service—demonstrated that by means of combining two wave-lengths, medium and short, it was possible to maintain regularly a two-way ground and air communication over the entire Africa air route. The performance of this new equipment, in the new monoplanes already operating on the Africa route, has established new records in range and quality of aircraft communication in spite of the difficult electrical

conditions prevailing over Africa. Although, in actual practice, it is quite sufficient if an aircraft can communicate with a ground station 500 miles distant, short wave communication over distances up to 2,000 miles, as, for instance, from Cape Town to Mbeya in Tanganyika are reported constantly, while, when the emergency equipment for ground working was tested at Cape Town on medium waves, using a twelve-foot ladder as a support for the trailing aerial, two-way telegraphy communication was maintained with Victoria West, 380 miles away, and the messages from the 'plane were received at Germiston, Johannesburg, a distance of 830 miles.

A mast aerial is used for short wave communication, and it is quite easy, on winding in the trailing aerial, to switch on to this aerial and to transmit telegraph or telephone communication. In this way signals are received from the 'plane while it is still running across the aerodrome after landing.

In another chapter we describe the system of direction finding employed on the European routes, a system which relies on the ground station ascertaining the 'plane's position by wireless, and transmitting this ascertained position to the pilot of the aircraft. A new system which guides the pilot of an air liner to his destination has now been incorporated in the new wireless installations on the Empire 'planes. It differs from the method used on the European routes by enabling the pilot to ascertain his own bearing without having to query the ground station. It is appropriately named the "Homing" system, and works on the same principle as do the frame aerials generally fitted to portable wireless sets.

As all users of portable wireless sets know, it is necessary, in order to get the best results, to turn the set so that it is pointing directly towards the broadcasting

station from which the required programme is being radiated, while should the set be at right-angles to this direction, no signals are received. The wireless "Homing" system for guiding aircraft consists simply of an aerial in the shape of a loop round the wings, which works in conjunction with the normal trailing aerial. The operation is extremely simple, being limited to the manipulation of a three-position switch. With the switch in the centre, the loop aerial alone is connected to the receiver, and if the air liner is flying directly towards the transmitting station then no signal will be heard. A check is provided by placing the switch in the right or left-hand positions, when it will be found that, owing to the action of the trailing aerial, signals of equal strength are received. If the head of the aircraft, however, points away from the direction of the transmitting station, a signal is heard even when the switch is in the centre position, while on switching to the right and left, signals of different strengths are heard, indicating to the pilot the direction of destination. To get a corrected course, the nose of the 'plane is turned until signals in the right and left-hand positions are received at equal strength; and, as an additional check, with the switch in the centre position signals would be inaudible.

It is obvious that, however good the wireless equipment fitted to the aircraft, its value is decreased if there are not sufficient, and efficient, ground stations with which the crew can communicate. Therefore, when the agreements for the operation of the various Empire routes were signed, one of the first considerations was the provision of adequate wireless ground stations. On the India route there was the nucleus of this equipment already existing in the various R.A.F. wireless stations in Egypt, Palestine, Iraq, and India, while wireless

stations also existed at certain points in the Mediterranean, operated by the various Governments of the countries in which they were situated. There remained, however, long sections down the Persian shores of the Persian Gulf where no wireless equipment existed, and here special stations were erected at Bushire and Jask; while, when the route was changed to the Arabian shores of the Gulf, stations fitted with the most up-to-date equipment were erected at Bahrein and Sharjah.

With the signing of the agreement for the Africa route, a complete chain of stations became necessary, as south of the Sudan practically no suitable wireless facilities were in existence. Under the terms of the agreement with the operating Company, the various Administrations agreed to provide the necessary wireless ground stations, and the Administrations of Uganda, Kenya Colony, Tanganyika, Northern Rhodesia, Southern Rhodesia, and the Union of South Africa erected suitable stations in their various territories. These were all built by the Marconi Company, the entire apparatus being manufactured in Britain. They were of the latest design, and suitable for transmission and reception on medium and short wave-lengths, and, quite apart from their use for maintaining communication with aircraft on the African air route, they have at the same time greatly facilitated interior and exterior communication throughout the Continent—this being an extra benefit which the coming of the airway has conferred.

Twelve of these African route stations were erected, being situated at Kampala in Uganda; at Nairobi in Kenya Colony; at Moshi, Dodoma, and Mbeya in Tanganyika; at Mpika and Broken Hill in Northern Rhodesia; at Salisbury and Bulawayo in Southern Rhodesia; and at Germiston, Victoria West, and Cape Town in the Union of South Africa. The erection of



One of the fast Atalanta-type four-engined monoplanes, as now used on Indian and African sections of the Empire air-mails. They cruise at 120 miles an hour, carrying a two-ton load, and are capable of a maximum speed of 150 miles an hour

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these stations, in conjunction with the existing stations in Egypt and the Sudan, and the equipment of the aircraft with the new long and short-wave wireless sets, and the "Homing" device, enables aerodromes and machines in flight to be kept constantly in touch with each other, and also allows messages to be sent from any point along the air route to any other point almost instantaneously. The system, in fact, now renders the Africa service the most highly organized, from a wireless point of view, of any long-distance air route in the world.

The introduction of four-engined aircraft, with their ability to continue in the air even should one engine fail, has resulted in flights being made in weather in which, with the older type of aircraft, it was considered impossible to fly. The principal objection to flying in foggy or misty weather, or in any other condition of bad visibility, has been the difficulty of alighting safely should the aeroplane be compelled to descend through engine trouble. With this risk practically eliminated, however, it became feasible to make aerial journeys in weather conditions where visibility was extremely poor; in fact, so long as the aerodrome of destination is reasonably clear, and visibility is sufficient to enable a landing to be made, it is now possible to take-off from a fog-shrouded aerodrome, and to fly through or above clouds, without once seeing the ground beneath, until the aerodrome of destination is reached. Under such circumstances, it is obvious that pure navigation has to be employed in the guiding of the aircraft to its destination. In the early days of flying, and, in fact, in the early days of commercial air services, pilots flew from point to point by following well-defined landmarks, such as roads, railways, or rivers, having, of course, an additional guide as to their general direction in their

aircraft compasses. With the introduction, however, of regular bad weather flying, where visual guides were obliterated, the wireless direction finding apparatus, both of the type operated by ground stations, and the "Homing" device just described, helped the pilot in keeping to a true course.

There is, however, yet another difficulty. When flying in fog or cloud, the pilot has no horizon from which he can tell the actual position of his machine in regard to the ground; that is to say, it would be quite possible for a pilot to be flying at an angle of 45 degrees in relation to the ground, or even upside-down, without knowing it, and even with wireless aids it was obvious that some further assistance had to be given him to enable him to fly safely, and on an even keel, in conditions of bad visibility. There has, therefore, during the past few years, grown up a system which is known as "blind-flying", whereby the pilot, with the aid of special instruments, can fly his craft unerringly on a pre-determined course without once seeing the ground. Of the instruments used, the most important is the turn indicator, which has been developed to such an extent that it now tells a pilot not only whether he is flying level, but also should he deviate or turn from his course; and with these instruments fitted in four-engined aircraft, equipped with modern wireless, pilots now make flights in weather conditions which, only a few years ago, would have been considered impossible.

Before leaving the flying side of the organization, it would perhaps be as well to give a few details as to the selection and training of the actual crews of the aircraft employed. In the large machines used on Empire routes, a crew consists normally of a Commander, First Officer, Wireless Operator, and a steward or stewards. The Commander, as his title indicates, has complete charge

over his craft. He personally takes off and lands the machine, but while in the air he can hand over controls in favourable circumstances to his First Officer—who is also a skilled pilot—while he himself makes a tour of the aircraft to see that his passengers are comfortable and that the stewards and wireless Operator are attending efficiently to their respective duties. The Commanders on our big air-liners are all picked men, with thousands of hours of flying experience. Most of them have served with the R.A.F., piloting large multi-engined bombing 'planes or multi-engined flying-boats. The First Officers are also pilots of great experience, and serve as such until they are considered to have obtained sufficient experience of flying, on the actual air routes, to warrant their promotion to Commander as vacancies occur. At the time of writing there are thirty-four air-liner commanders in the service of Imperial Airways, together with twenty-five first officers who fly as assistant pilots with the commanders, and are fully qualified to take charge of a machine as required. Wireless Operators are all licensed by the Government, and before this licence can be obtained they must pass an arduous Government test as to their efficiency, while most of the stewards have had many years' previous service as stewards on ocean liners. There is keen competition for all these positions mentioned, and the airway operators are in the position of being able to select only the finest human material.

CHAPTER X

GROUND EQUIPMENT AND STAFF OF A MODERN AIR-MAIL

Mediterranean links on the Empire routes—The trans-desert sections—Fortified air-stations—African halts—Rest-houses in the jungle—Stories from the African route—Wild life and the air-mail—Men of a new calling—How the Empire air staffs are chosen and trained

IT was the great Napoleon who once said that an army marches on its stomach; and to-day, of the modern airway, one might say that it flies on its ground organization. Certainly it relies for its regularity on its ground organization, and our British Empire airways have, from the first, tackled very thoroughly all the questions which arise in the provision of ground equipment.

The territory over which the Empire air routes pass includes widely-differing types of country, while, in addition, there is the flight over the Mediterranean to be taken into consideration. The passage over Europe can be eliminated from our consideration, as the various European Governments have provided aerodromes and equipment which are used for the operation of the network of air services which have grown up in Europe during the last fourteen years; while on the European side of the Mediterranean, facilities for the operation of flying-boat services have also been provided by the countries concerned. There was, however, at the time the first Empire services were instituted, no organization whatever for the crossing of the Mediterranean from Athens to Egypt; and, after a survey of this

district, it was decided that the obvious intermediate station was in the Island of Crete, and the harbour of Mirabella appeared to be the ideal situation for a flying-boat halt. At the same time, it became apparent that some form of mobile emergency equipment would be necessary in order to assist any flying-boat which might have to alight on the water during a Mediterranean crossing, and it was decided to obtain a motor yacht and base it at Mirabella Harbour, Crete, to be used, primarily, as a re-fuelling station and half-way halt, where passengers could be served with meals, and also as a wireless station for the guidance of the flying-boats crossing the Mediterranean. It served, also as a means of reaching any flying-boat which had to descend whilst on the Mediterranean crossing but in this respect it has not been called upon more than twice during the six years the services have been in operation.

As the flying-boats did not operate beyond Italy towards England suitable provision had to be made in the Mediterranean for their maintenance and overhaul, and to this end a complete organization was laid down at Alexandria, which could deal not only with the ordinary details of everyday maintenance, but which could draw the flying-boats out of the water and carry out complete overhauls as they became necessary, thus keeping the Mediterranean fleet in perfect condition. In passing it may be mentioned that the flying-boats used in the Mediterranean have been moored out on the water in all weathers for months on end, all routine overhauls having been carried out with the flying-boats at their moorings, even to the changing of engines—special gear being designed and utilized for this purpose.

Once across the Mediterranean the India route—which was, of course, the first to be put into operation—was an all-land route. It passed, in the first place,

across the desert districts which separate Cairo from Baghdad; thence over a vast swamp area along the course of the Euphrates and the Tigris to the head of the Persian Gulf, and thence—on its original route along the Persian shores of the Gulf—over wild rocky country with very few points where landing is feasible; in fact, as one traveller says, "hereabouts the country gnashes its teeth at you". A further consideration, in planning the ground organization for this route, was the fact that it passed through territory in some parts of which the inhabitants were mainly wild and lawless tribes, and adequate precautions had to be taken to protect air travellers, and the air service supplies. It has already been mentioned that, when the Royal Air Force pioneered the route from Cairo to Baghdad, they ploughed a furrow through the desert to act as a guide to the aeroplanes; and they had, in addition, established emergency landing grounds at various points along the route with underground stores and petrol which, incidentally, were occasionally raided and plundered. With the coming of the commercial air service, with its need for providing passengers with more amenities than were necessary for pilots carrying mails but no passengers, it was decided to construct a main aerodrome with full facilities at Gaza, in Palestine, and also at Rutbah Wells in Iraq, in addition to maintaining the emergency landing grounds at other points. At Gaza the aerodrome simply consisted of providing adequate sleeping and living accommodation for the personnel on the aerodrome and for passengers who stopped there for a meal or for the night; but at Rutbah Wells, which is situated in the heart of country peopled by hostile tribes, it was deemed necessary to build a fortified station which could not only house the air-mail travellers, but also—if necessary—protect them.

It is interesting to note that since this fort at Rutbah was built several years ago, it has not on any single occasion had to exercise its functions as a fortified station, its mere existence being sufficient to prevent marauding tribes from attempting to molest or interfere; while, in addition, there has grown up round the station quite a colony of peaceful Arabs, who find its immunity from attack to their liking. This colony of Arabs grew up spasmodically, and without much control, building dwellings of petrol tins and anything else which could be pressed into service, until this year the surrounding district became such an untidy heap of crude dwellings that the order went forth that all buildings must be properly built of stone or brick, and that the petrol tin erections must be demolished.

Baghdad was the site for a night halt on the Indian airway, and here a complete aerodrome with wireless and weather equipment, sheds, and workshops, had already been laid out by the Royal Air Force. It may be mentioned that Baghdad, from that early start, was to become quite an important centre for aviation, for as air communication developed a Dutch service from Holland to the Netherlands Indies was operated via Baghdad, and a French service from Marseilles to Indo-China also passed through Baghdad, while Russian and German services to Persia were, after a time, extended from Teheran to Baghdad. This resulted in the Iraq Government building and equipping an up-to-date air-port nearer the town than the old R.A.F. aerodrome, and the ancient city of Baghdad has to-day a modern, up-to-date and efficient air-station, through which the air-liners of several nationalities pass in their regular weekly journeys.

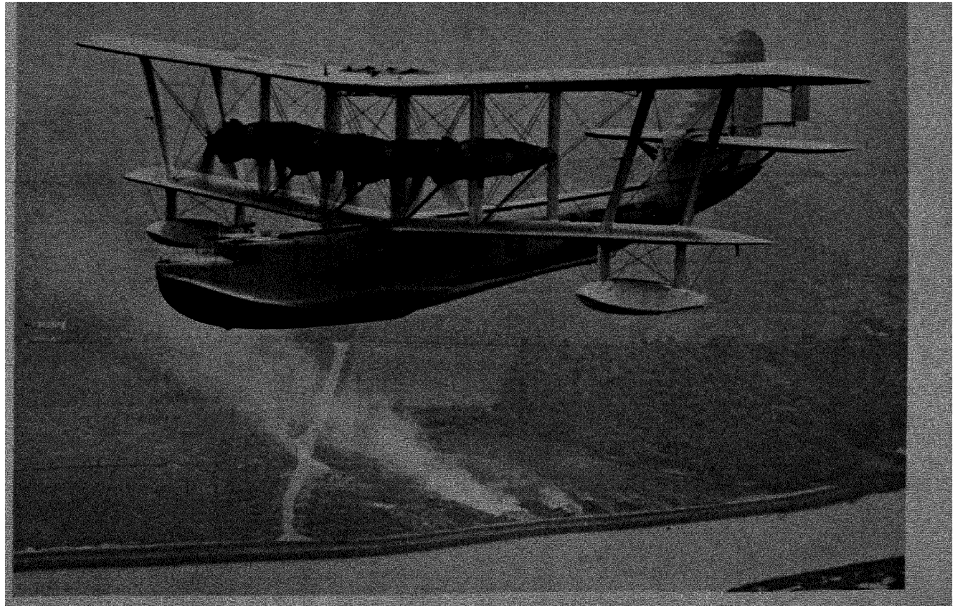
Leaving Baghdad, the air route passes along the Tigris to Basra, the journey from Baghdad to Basra being

non-stop, and emergency alighting grounds only being provided between these points. At Basra an aerodrome some distance from the town, at Shaibah, had been established during the war by the Royal Air Force, and various buildings on the aerodrome were adapted for the purpose of accommodating passengers and staff. From Basra the original route passed through Persia, where there were aerodromes in existence at Bushire and Jask; but these were without the necessary wireless equipment, and this had to be provided, and staffed, before the service could be operated over the wild country along the Persian shores of the Gulf.

Another aerodrome was established at Gwadar, in Baluchistan, and the terminus of the Indian air line was at Karachi, where there existed a large aerodrome, fully equipped with sheds and having, in fact, a large airship shed which was being erected with the object of operating airship services in the future. The whole of these aerodromes were linked up by wireless telegraphy, and wireless communication was also maintained by them with the air-liners during their flights.

Special equipment, and furniture, had to be sent out and installed on each of the aerodromes where the air-liners halted, so as to provide passengers with the necessary amenities, such as meals, beds, and baths, while in some places special arrangements had to be made to enable adequate food supplies to be maintained at the aerodromes, owing to the scarcity of provisions of a suitable nature in the districts surrounding the stations.

In 1932 the Indian route, owing to reasons which have been stated previously, was changed to the Arabian side of the Gulf, where no facilities of any description existed. Survey parties had to plot out sites for aerodromes and emergency landing grounds, and main aerodromes were established on the Island of Bahrein,



One of the Scipio-type, mail-carrying air-boats, which maintain the Mediterranean sections of the routes to India and Africa

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and at Sharjah in the Oman Peninsula. At Bahrein there is a European and American colony, and a large tract of ground, suitable for use as an aerodrome, was available. An illustration of the difficulties encountered was provided when a large four-engined air-liner first alighted on the site chosen for the aerodrome at Bahrein. Although it had appeared, during the survey, that the surface of the aerodrome was hard and solid, when this big air-liner, weighing something over 13 tons, alighted on the aerodrome, the landing wheels sank into the ground, and it was found that what had been thought to be firm ground was merely a hard crust with soft ground beneath, and a new site had to be located.

At Sharjah there was no European population, and here again, as at Rutbah Wells, there was the possibility of molestation by hostile tribes, and from the first it was deemed necessary to provide adequate protection for air travellers at this point. To this end an elaborate fortified rest-house has been erected and is, at the moment of writing, on the point of completion. It provides, in this wild district, the full amenities of modern civilization, with electric light, fans, baths with hot and cold water, and a constant supply of ice. Until this fortified rest-house was complete, passengers were accommodated in tents; but, even so, they were ensured a luxury and comfort which aroused the enthusiasm of all air travellers who stayed the night there; in fact, it may well be said that the organization of the night halt, with all the convenience of a civilized hotel in this wild region, has been a triumph for the airway ground staff.

The ground organization of the 6,000 miles' route from Cairo to Cape Town presented problems differing entirely from those encountered on the India route. There was, of course, the sandy stretch in Egypt and the Sudan, but this had already been opened up for tourist

traffic and to some extent commercially, and as the air route followed closely the course of the Nile, there was a certain amount of accommodation already available for passengers; while transport by boat along the lower reaches of the Nile, for the necessary equipment and stores, was comparatively easy. On this sector, main aerodromes were established at Cairo, Assiut, Assuan, Wadi Halfa, and Khartoum—all of which had previously been used by the Royal Air Force.

The aerodrome at Cairo was situated at Heliopolis, and was the R.A.F. Base, serving also both the Indian and African-airways. It is at Heliopolis, in fact, that the main organization of the air-mail services operating in northern Africa, the Mediterranean, and on to India, is situated. At this area headquarters a complete organization exists, not only for dealing with the ground organization for the district, but also for the complete overhaul and maintenance of the air-liners and aero-engines used in the operation of the services. So complete is this organization that once an air-liner is delivered to the area at Cairo, it can be kept in service, without having to be returned to England for overhaul, throughout the whole of its useful life. The organization at Cairo is, in fact, as self-contained as it is possible to make it.

Wherever possible, in this area, existing hotels which have been built at various points along the Nile—principally for the accommodation of tourists—have been utilized for the convenience of air travellers; but at one or two places, especially where the hotels are only open during the tourist season, arrangements have had to be made for providing meals at various halting points, and also for the accommodation of the staff. At Assuan, for instance, where passengers stop for lunch, a tent was erected in which passengers were served with a meal. This tent affords an illustration of

how every item which will contribute to the comfort of passengers is studied by the air-mail staff. It was found that the heat in this district was extremely trying, and that even inside the tent the reflection of heat from the sandy floor was uncomfortable. The airway staff at Assuan therefore hit upon the plan of covering the entire floor of the tent with small pebbles, which were watered immediately before the passengers arrived, thus producing a cool and soothing atmosphere, which afforded a welcome contrast as one entered from the hot sand and blazing sun outside.

Further up the river, at Wadi Halfa, which is in the heart of the desert, a hotel exists which caters for the tourist traffic, and, when the air-line was originally planned, this point was scheduled as a night halt. The staff here were actually housed in the residence occupied by General Gordon, and later by Lord Kitchener, and this historic building is a centre of attraction for passengers who spend the night there. Some idea of the nature of the country in which this station is situated can be gained from the fact that on a recent report from Wadi Halfa it was stated that rain had just fallen there. The significance of this piece of news can be more readily appreciated when it is learned that the last rain recorded at Wadi Halfa occurred 23 years previously!

In spite of its arid nature, the airway staff have succeeded in making quite a pleasant oasis in this desert spot. They have dug deep into the ground and have succeeded in finding water, and, with the help of this water, have actually constructed gardens in the sandy desert, in which they have raised vegetables such as melons and tomatoes, which are served to the passengers. The water from the well, furthermore, has proved to be of amazing clarity and coolness for drinking purposes. It is here, also, that efforts have been made to furnish

not only the amenities of civilization in the shape of creature comforts, but also to provide passengers with recreation. One party of travellers, for instance, were taken by felucca to the opposite side of the Nile, where they visited an ancient temple. On their return they were conveyed to the gardens of Halfa itself, where the band of the Sudanese Defence Force—who were making a tour of the Sudan—was playing. Passengers stated that they had had a most enjoyable evening, and that the band, although composed entirely of Sudanese, gave excellent renderings both of English classical and dance music. A golf course has also been laid out, and airway passengers halting for the night at Wadi Halfa can look forward to some amusing golf and some very tricky hazards. A stretch of sand which may be regarded as a fairway one day, is, after a spell of rough weather, converted into a series of bunkers by the next morning; while one side of the course runs past the local prison, a ball sliced into the prison grounds being, for obvious reasons, lost!

The airway staff have taught the local Sudanese to play football, but, as the Sudanese do not wear boots, they have had to confine their own foot-wear to canvas shoes, and the result of kicking a hard football with a soft-toed canvas shoe can well be imagined.

Wadi Halfa is also noted for its hyænas, and at times these cause some alarm and annoyance. At night their screeches sound uncomfortably near, and the natives tell sad stories of how their goats and sheep are carried off by these noisy night marauders. So great does the annoyance become at times that " shoots " are organized with the object of thinning out the animals. This is no light task, as the hyænas, although plentiful at night, seem to vanish completely during the hours of daylight. The animals apparently resent the coming of the air-liners,

and regard the noise of engines running-up as a direct challenge. They are, however, of a cowardly nature, for their only reply to the challenge is to keep at a safe distance and enter into competition with a loud chorus of howls and shrieks.

When the Nile rises, during its annual flood period, crocodiles make their appearance in the river. At times the Nile reaches an abnormal level, being, in fact, so high in places that it actually passes close to the native houses. Recently there was a local rumour that the head of a gigantic crocodile had been seen in the swollen river. The natives were in a panic in case they should be visited by this pest during the moonlit nights when the river was close to their houses, and, in order to guard against such a calamity, they rattled tins containing stones and threw stones into the river throughout the night, with the object of keeping the unpleasant visitor away. This noise, in conjunction with the chorus of the hyænas, made sleeping somewhat difficult!

In spite of the fact that there are points on the air-mail route very much nearer the equator, Wadi Halfa is one of the hottest places in Africa, a temperature of over 120 degrees in the shade being registered for days on end; while nightfall brings little relief, the heat affecting not only humans but also the inhabitants of the local chicken-roosts as well. On specially hot nights sleep is almost impossible owing to the incessant crowing of the male section of the feathered population, and, should the temperature fall a few degrees, a welcome relief is provided not only by the cooler atmosphere, but also by the immediate cessation of the barnyard chorus.

The coming of the airway service has been a constant source of wonder to the natives. At the request of the Governor, not long ago, parties of Sudanese school-children were conducted round the air-liners, and the

size and luxury of the interior of the machines appeared to bewilder them, as they continually murmured "Esh, esh!" or "Wonderful, marvellous!" Many of the natives in the Sudan are apparently unable to distinguish the days of the week, and the local police have, in the past, had some difficulty in ascertaining the actual time of the occurrence of various crimes. Now, however, they have found a satisfactory solution of this problem, and to their question of "What day did this happen?" they receive replies such as: "Two days before the aeroplane going north came" or "The day the aeroplane passed over our village going south".

The staff at Wadi Halfa have to contend with the after-effects of an event which took place many years ago. It appears that, during the operations in the Sudan under the late Lord Kitchener, some of Kitchener's Forces encamped on the site of the aerodrome, leaving behind them a quantity of broken glass. Although this occurred many years ago, broken bottle-glass is still steadily working its way to the surface, and periodically the Staff have to clear the surface to prevent the glass from cutting the tyres of the air-mail 'planes.

Further up river rain is more prevalent and at Atbara —another port of call on the air-mail—heavy rains gave rise to a strange phenomenon recently. After the rain had ceased, fish were found swimming about in the rainwater pools, and the only theory which would account for their presence was that, when the rain was at its heaviest, the fish had swum up from the main river through rainwater rivulets, being eventually, as the rains eased somewhat, marooned in the rainwater pools.

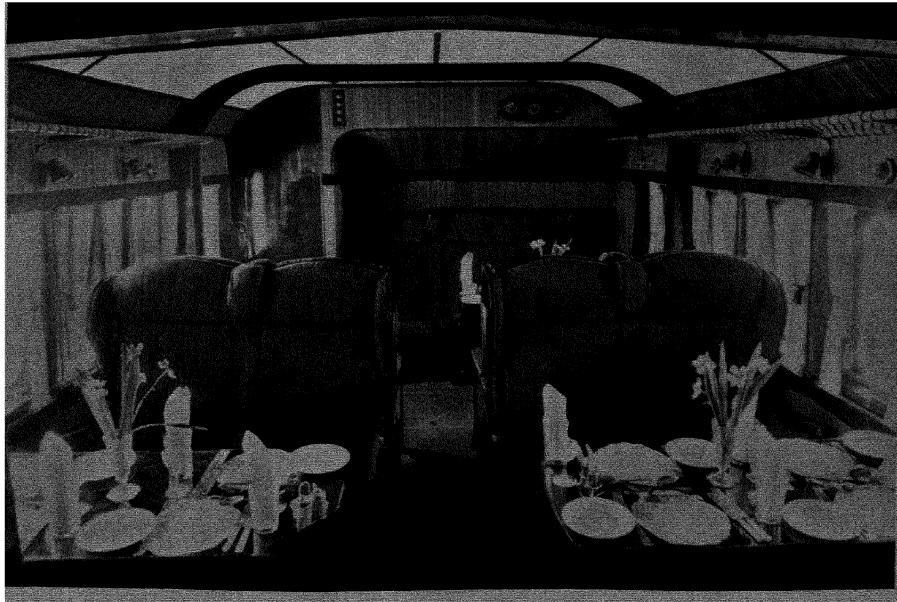
At Khartoum, which can be regarded as the end of this sector and which on the new accelerated air-mail schedule, although 1,115 miles from Cairo, is reached in a single day's flying, the aerodrome is again one

which was used previously by the Royal Air Force. Khartoum marks the end of what might be called the desert section, and from Khartoum to Lake Victoria, in the heart of Africa, stretches a vast area of swamp ; and the existence of this swamp, or Sudd area, created an awkward problem for the organizers of the air-mail route. A survey revealed that there were insufficient sites for aerodromes not subject to flooding during the rainy season, and, in order to maintain the service on an all-the-year round basis it was found necessary in the early stages to operate this section with flying-boats, which used the waters of the Nile as natural alighting areas. This meant that after the journey from Cairo to Khartoum had been made in land machines, a change had to be made to flying-boats, with the result that an entirely different ground organization had to be laid down in this swamp area. Mooring buoys were fixed to the bed of the river, and at Kisumu, on the shores of Lake Victoria, flying-boat sheds and a slip-way, up which the flying-boats could be pulled for overhaul, had to be built. Although the Nile itself provided a natural area for alighting, it was by no means trouble-free. During the rainy season the river became very swollen, and large quantities of floating debris swirled down the river, constituting a danger to aircraft alighting and taking-off, and also fouling the mooring buoys. So great were these masses of grass which floated down at times that they pushed the buoys to the bottom of the river, and both steamers and motor-boats had to be employed to haul up the mooring buoys and free them from the obstructions. In some cases the swirling debris broke mooring chains and carried away buoys entirely, and, owing to the distances from which new buoys had to be brought, great inconvenience was caused. It is a tribute to the efficiency of the air-mail

staff on this sector that on no occasion was any service delayed due to these troubles, temporary mooring arrangements being hastily improvised and the service operated to schedule. It was evident at an early date, however, that every effort should be made to overcome the necessity for operating this sector by flying-boats, and to make arrangements so that the service could be operated by land-planes throughout the entire route. During the dry season sites for aerodromes were found, and the experts in aerodrome construction set to work to find means for rendering these sites available for the use of land-planes even in the rainy season. The scheme adopted was to construct " runways " in the direction of the prevailing winds, and at Malakal and Juba these runways were to all intents and purposes actual road-ways lying on the top of boggy ground.

By the present year, 1933, sufficient progress had been made with the construction of these runways to enable land-planes to be used throughout the rainy season, although constant vigilance had to be maintained by the aerodrome staffs to repair damage to the runways caused by heavy rains. At Malakal, for instance, the mail-planes had at one period not only to alight on the runway, but all refuelling operations had to be done with the machine still on the runway, as any attempt to taxi across the aerodrome would have resulted in the 'plane becoming bogged.

The construction of these all-weather aerodromes through this great swamp area, which covers 1,300 miles of the route, has made it possible this year for the huge four-engined thirteen ton air-liners of the " Hannibal " type to operate right through from Cairo to Nairobi in Kenya Colony. The maintenance of these runways, however, cause the staff considerable anxiety, as it is not only the weather which they have to fight against,



Luxury up in the air. Tables laid for luncheon in the saloon of one of the big flying-boats operating the Mediterranean sections of the Empire air-mails

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but also the animals living in this jungle country. Quite recently a large herd of elephant, estimated to contain several hundred animals, passed across the aerodrome at Juba. Luckily they avoided the runway, and opinion was divided as to whether, should they have traversed the runway, they would have acted as a form of roller, or whether they would have caused damage to the surface.

During the operation of the air services it is sometimes necessary for the mail-planes to alight or take-off during the hours of darkness, and in order to assist them flares are laid along the runways. It was found that, contrary to expectations, these flares attracted rather than repelled animals, and on one occasion a large herd of buck wandered on to the runway apparently with the intention of investigating these strange lights. Before the air-mail 'plane could take off it was necessary to drive a lorry with headlights full on, and with the hooter sounding hard, along the runway to drive off this herd.

The end of the great swamp area is reached at Kisumu on the shores of Lake Victoria, where, as already mentioned, there is a slipway and sheds for the handling of flying-boats, and also an aerodrome for land-planes. The slipway will probably fall into disuse, following the success of the efforts at making the aerodromes in this district suitable during the rainy season, but in the early days—when the slipway was in regular service—considerable anxiety was caused by the occurrence of floating islands which drifted down the bay of the lake. These islands consisted of large masses of trees and undergrowth which had been broken down by storms and which had, in some way, collected together. On one occasion a particularly large floating island, some two or three hundred yards long with undergrowth nine to ten feet high, floated towards the slipway and

was only just prevented, after arduous work on the part of the airway staff and every available native, from entering the basin of the slipway, which would have completely blocked the entrance, and would have taken many days to remove.

Kisumu is the nearest town to the new Kakemega goldfields which were recently discovered in Kenya, and the township has, as a result, grown rapidly. In connection with these goldfields a new type of gold rush developed. Instead of the long and arduous trek across wild and unexplored country which has been the chief characteristic of most former gold rushes, this Kakemega gold rush took place chiefly by air, and prospectors, engineers, and miners rushed to the goldfields, using the air-mail not only from other parts of Kenya, but also from South Africa and Europe.

Nairobi, the next halt on the air-mail route, is the capital of Kenya Colony, and even before the coming of the air-mail service Nairobi had become air-minded, a local transport company having already established an air-taxi service which had achieved considerable success. It was necessary, however, with the coming of the air-mails to enlarge the aerodrome and to provide greater shed accommodation, together with wireless and weather services. Nairobi is in the heart of the big-game country, and the aerodrome has, in fact, had to be surrounded by a game-proof fence. The arrival and departure of the weekly air-mail has become one of the sights of the town, and people motor out to the aerodrome to witness the departure of the service in the early morning, many in evening dress coming straight from various hotels where dancing has been going on through the night. In addition to this human interest, zebra, wildebeest, and occasionally lions assemble outside the game-proof fence to watch the departure of the air-mail.

It is in Central Africa that the air-mail shows the greatest saving as compared with other methods of transport, and this has resulted in the air service being greatly used by the inhabitants. One of the most notable instances of this was the use of the air-mail by a school-boy, eleven years of age, who flew 5,000 miles from Nairobi to London to attend school in England, while another boy at school in Switzerland flew to Nairobi, and then back to Switzerland, in order to spend his summer holidays with his parents. This was accomplished in only twelve days' flying, but by any other means over six weeks would have been occupied by the double journey.

From Nairobi "feeder" services have been established by local enterprise connecting the main air-mail route with the coast at Mombasa and onwards to Dar-es-Salaam and across to the Island of Zanzibar.

From Nairobi, flying southward, the air service passes through Tanganyika to Northern Rhodesia, and this section of the airway is over practically virgin jungle, abounding with game of every description and, apart from natives, almost uninhabited. Dodoma, the only town of any size in the interior, is the first halt on this section and here, as in the swamp area, special runways have had to be constructed on the aerodromes in order to provide a firm alighting ground in all weathers. The rain at Dodoma is almost clock-like in its regularity, a heavy fall being experienced each afternoon in the rainy season, the rest of the day being fine; but during the period of rain the fall is exceptionally heavy, and causes heavy flooding which has an adverse effect on the aerodromes. The rainy season also appears to encourage the activities of ants and other insects. It is astonishing the amount of damage which ants can do to an aerodrome by throwing up ant-hills, and the staff at

Dodoma have to be particularly wide-awake in order to combat the activities of these insects, and keep the aerodrome in a fit state for the operation of the services. Not only have they to combat the ravages of insects, but while doing so a sharp lookout has to be kept for wild animals, for, in addition to hyænas and jackals, which are regular frequenters at the aerodrome, no fewer than seven lions were seen on the aerodrome during one week. A small baby baboon, which the Staff keep as a pet, gives early and loud warning, however, of the approach of lions, being apparently able to smell and hear them long before their presence is apparent to human observers.

The aerodrome at Mbeya, the next halt, is particularly interesting. It is in the heart of the jungle, and for three months in the year, during the rainy season, is entirely cut off from communication with the outside world except by air. In spite of this, Imperial Airways have established a rest-house there, where passengers spend the night. It is complete with every comfort, including electric light, refrigerators, and baths with hot and cold water, and it is a source of constant amazement to passengers that they should descend in the heart of this tropical African jungle and be served immediately with iced drinks. A good example of the service which the air-mail is able to give in these remote districts was instanced when there was a threat of an epidemic of enteric fever at Mbeya. A wireless message was sent to Johannesburg; whereupon the air-mail brought a special serum from the Johannesburg Institute and all the station staff and Europeans in the district were immediately inoculated and the epidemic stopped.

Continuing south, the air-mail next alights at Mpika, another out-post in the heart of the jungle. At Mpika there is a mowing machine and a roller hauled by oxen,

and the presence of these oxen resulted in an increase of lions in the vicinity of the aerodrome. At this aerodrome the mail-planes arrive some two hours before dawn, and a flare path down which the machines can land has to be laid before their arrival. The procedure adopted is for native boys, each carrying two flare buckets, to walk out in line, the Engineer-in-Charge armed with a Verey light pistol, bringing up the rear, the pistol being used not to frighten the lions but to "persuade" the boys. The trembling of the boys increases rapidly when the first growl is heard, and the resultant rattling of the buckets scares off the lions!

After its passage through the African jungle, the airway again joins the railway at Broken Hill in Northern Rhodesia, but although a railway line pierces this territory, there are still vast stretches which are undeveloped, and the coming of the aeroplane is regarded in Rhodesia as an important factor in its future progress. Although main aerodromes had been established in a line through North and South Rhodesia for the use of the air-mail service, the Beit Trust, having regard to the importance of air transport to Rhodesia, authorized in 1932 an expenditure of £50,000 for the improvement of ground facilities; with the result that there is now throughout Rhodesia a series of aerodromes and emergency landing-grounds with telephone, wireless, and meteorological facilities. In addition, many of the farmers in Rhodesia are constructing private aerodromes on their farms with the object, later, of owning light 'planes and thus bringing themselves into closer touch with the large towns.

It was at Broken Hill that the first and only stowaway so far found on any of the Empire services was discovered. The stowaway, a man, had apparently concealed himself behind the large freight compartment

in the southbound air-mail 'plane at Mbeya, and was not discovered until the machine alighted at Broken Hill. He was handed over to the immigration authorities and then flown back on the next service to Mbeya, where he was charged with endangering the safety of the aircraft, passengers, and crew. He was found guilty and sentenced to three months imprisonment with hard labour.

At Broken Hill another " feeder " service connects with the main air-mail route. This carries mails to and from Broken Hill and the southern part of the Belgian Congo, enabling mails to be flown from the Congo through to Cape Town or northward to Europe. Lately this service has been extended in order to carry passengers from Broken Hill to Elizabethville, where it connects with the Congo railway system.

The coming of the airway to Rhodesia provided some good stories of the reaction of the natives to their first sight of an aeroplane. A correspondent in one of the local newspapers relates the story of a native girl's query as to whether the aeroplane had feathers after she had seen a machine in flight for the first time, while another story from an Umtali correspondent, who adds " Believe It or Not ", reads as follows :—

" On the occasion of the visit of the first aeroplane to Umtali, a friend of mine happened to notice a native gazing at the 'plane circling above with sheer rapture and wonder written all over his face. My friend asked the native if he would care to be carried up in the white man's machine. The native replied that he would not, but that he would very much like a sitting of its eggs."

From Broken Hill the airway continues through Rhodesia to Salisbury, where the air-mail is proving a great boon to the Rhodesian tobacco industry. The tobacco planters are in the habit of sending samples of

their crop to London in order to obtain bulk purchasers. Prior to the inauguration of the African air route, fairly bulky samples were sent by rail and sea, and, with handling and other charges taken into consideration, the cost for each sample consignment amounted to several pounds, and the time required for a reply was well over a month. Now, however, by using the air-mail to London for the dispatch of samples and the new beam radio system from London to South Africa for cabled replies, the whole deal can be complete in fourteen days, or, by using the air-mail both ways, in twenty days at a total cost of 13s. 3d. Great interest has been shown in the air-mail service by the Government of Rhodesia, and when Sir Eric Geddes, Chairman of Imperial Airways, flew over the route, the Government and the entire Cabinet of Southern Rhodesia were all in the air together in one big air-liner.

In spite of the fact that the air-mail route traverses the wildest parts of Africa, it operates with perfect regularity, and this point is illustrated by the story of a keen golfer in Salisbury, who stated that for weeks on end the air-mail service had arrived over the local golf course just as he was at the sixth tee. This player started his game at the same hour each day, and it speaks highly of the regularity of the service, which has already covered 6,000 odd miles, that its appearance over Salisbury should coincide exactly each week with the arrival of this player at the sixth tee.

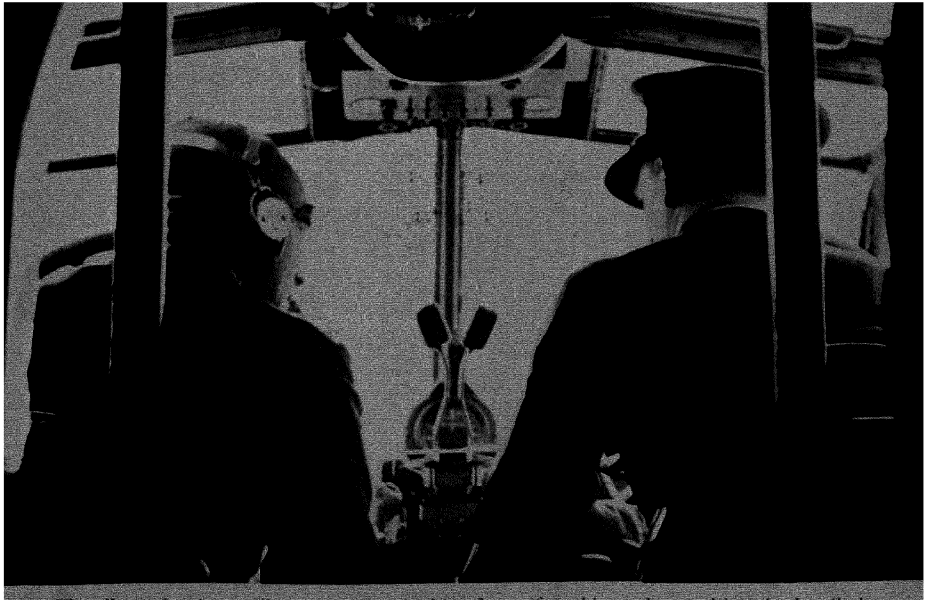
From Salisbury the route passes via Bulawayo and Pietersburg to Johannesburg, which is the headquarters of the air-mail route for the southern part of Africa. Here, as at Cairo, a complete base with repair sheds, traffic staff, and engineers, has been established to serve the aircraft flying over the southern half of Africa, the aerodrome being completely equipped with every modern

facility. From Johannesburg to Cape Town is a single day's flying, halts being made *en route* at the diamond-mining town of Kimberley, and at Victoria West, Cape Town being reached only ten days after leaving London.

To summarize the ground organization on this great trans-African airway it may be said that it consists, in the main, of 27 main aerodromes and more than 50 subsidiary alighting points, and 17 wireless stations. Throughout the whole of this 5,700 miles air route perhaps the most important service which has to be rendered to the aircraft is to supply them with petrol, and this organization has been carried out entirely by the Shell Company. In order to ensure that a supply of petrol is available at all alighting grounds, every type of transport by sea, rail, road, animal, and human carriers, have all had to be pressed into service. In this connection there is the story of a consignment on its way to one of the landing-grounds in the heart of the African jungle. The native carriers, finding that one tin leaked, came to the conclusion that their loads were merely water. Why carry water for several days to a place where water was available?

Obviously the thing to do was to empty the tins, and fill them up again just before they got to their destination; and thus quite a good consignment of tins filled with water instead of petrol, arrived at this remote Aerodrome!

One of the greatest difficulties to be overcome, in the inauguration of the Empire air-mail routes, was the provision of trained staff at various points. The technique of air transport was new and there was no existing reserves of personnel which could be drawn upon to supply the traffic staff and the Station Managers for these new airways. In order to overcome this difficulty, a school—the first of its kind in the world—was



The pilot and assistant-pilot in the control-cabin of one of our big modern multi-engined mail-planes

opened by Imperial Airways at their London Headquarters, and in this school numbers of young men underwent a special training in order to equip them for the task of going out and taking up positions along the Empire air routes. Some of them were Short-Service Commissioned Officers from the Royal Air Force; others were boys from the public schools. They were instructed by experts in all questions affecting the operation of modern high-speed air-lines. They had to learn the details of the expeditious handling of air-borne mails and freight. They made themselves familiar with the routine of aircraft maintenance and with the operation of weather reports. They also attended lectures on such subjects as wireless signalling and the organization of the airway. Some of them, who were earmarked as station superintendents at airway stations where rest-houses were being built by the Company to accommodate passengers, had to undergo a special course of training in hotel management at a London Institute.

By this method the first station superintendents for the Empire routes were trained. Later when a nucleus staff had been trained, and the services began operations, a different system for training pupils was introduced, whereby specially-selected young men spent twelve months in the London Office and at Croydon aerodrome, and then were drafted out to various points on the Empire routes, for a further two years, finally returning to London for another year as assistants to Senior Officials. In this way it is hoped to train sufficient numbers of airway traffic experts to ensure that forthcoming extensions of the Empire routes are staffed efficiently.

CHAPTER XI

THE PILOTS' ROOM AT CROYDON

Capt. Olley, the man who has flown 1,000,000 miles—Stories from the early days—A "classic" in forced landings—The eccentric passenger—Mental attributes of the flying man—The special chartering of mail-planes—Veteran pilots of the aerial mail

IT is in the air-mail pilots' room at Croydon, nowadays, that one finds men who know their air-ways just as sailors know their sea-ways—flying men who are tanned by tropical as well as European suns, and whose eyes have the far-seeing gaze of those who peer down constantly over vast distances. Wonderful men, these pilots of our flying mail; yet if there is one thing they dislike more than anything else it is being looked upon as heroes. They just laugh at the idea that there is any danger in the life of the modern air-mail pilot; which reminds one that years ago, when that pioneer airman, Wilbur Wright, was asked why he was so reticent, and why he made so light of his achievements, he answered:

"The only birds that talk are parrots, and they are not birds of high flight."

Those words apply to the attitude of our air-mail pilots of to-day. They do not talk. They have not the time. They are too busy flying.

Here, walking quickly into the pilots' room, is a brisk, dapper little man, swift and emphatic of speech. A wonderful man, this, even among these pilots of the flying mail! A million miles he has flown through bad weather as well as fine. More than three thousand

aerial crossings he has made above the English Channel, and all his aerial voyagings represent, nowadays, something like forty flying circuits of the globe. Capt. G. P. Olley is the name of this merry, quick-moving little man, whose speech is as rapid as the 'planes he flies, and who is well-known and popular along air-mail routes extending not for hundreds but for thousands of miles.

Since he first left the ground in an aeroplane, as far back as 1915, Capt. Olley has spent approximately 10,000 hours in the air. Wonderful, as might be imagined, are some of the experiences which this little man has had. Yet neither he, nor any of his fellow-pilots, have the smallest inclination of posing as super-men who have emerged, unscathed, from fearful combats with the elements. Capt. Olley himself declares, and the other air-mail pilots are quick to agree with him, that the modern aeroplane, when handled by anyone of experience, has become in many ways the safest high-speed vehicle in the world. Yet in the early days, when aero-engines were far less reliable than they are now, the story was very different. There was one occasion, for example, when Capt. Olley found himself in a predicament leading to a forced-landing which has become one of the classics of its kind in British flying.

It was Capt. Olley's task, on the day on which this particular adventure befell him, to fly in over London in an aeroplane from which an expert photographer was taking a series of aerial views of the metropolis. The weather was fine, the visibility was good, and everything at first went extremely well. The photographer had, in fact, almost completed his task, and they were thinking of returning to their starting-point on the outskirts of London, when suddenly, without any more than a splutter of warning, Capt. Olley's engine failed completely in

mid-air. The position, one need hardly say, was an extremely awkward one, because the aeroplane was at the moment still over a densely-populated area, with a prospect for its occupants, which was certainly not inviting, of having to come down pell-mell among houses, streets, and trams. As he came gliding down Capt. Olley made a swift survey of the whole area lying within range, and just as matters looked like being serious indeed he caught sight, amid the wilderness of streets and roofs, of an open space with a piece of water glinting in the middle of it. None too promising it looked, though, as the airman peered down at it, being such a very small oasis among the buildings, chimneys, railway-lines, and telegraph wires. Still, it was better than nothing. There was, in fact, no other choice. So Capt. Olley began to manœuvre his machine to reach this spot. And all might have gone well had not he observed, as he came gliding lower, that the only available landing space in this park was, at the moment, thronged with groups of children running here and there. This, as the airman realized in a flash, put completely out of the question any idea of coming down on one of the open stretches of grass, because he would have been certain, either when gliding in or when taxi-ing afterwards along the ground, to have struck some of these children, who would of course, under the circumstances, have been rushing about in all directions. But what was he to do? What was the answer to this new problem? The aeroplane was now losing height rapidly, and no other landing-place offered itself. Well, it is at such moments that an airman has to think quickly; and in another second or so, before he was too low, Capt. Olley had come to the conclusion that there was only one possible thing to do, and that was to alight in the lake which lay in the centre of the park.

That decision once made, Capt. Olley acted upon it with lightning speed. In a final glide, he brought his machine right in over the lake; then, by a quick and dexterous movement of the controls, he checked his forward speed when just above the surface, simply "stalling" the machine so that it sat down abruptly flat upon the water. There was a shock and a huge splash, and there the 'plane rested on the surface of the water! Fortunately the lake was quite shallow, so there was no question of any risk from drowning. As a matter of fact, so cleverly had that forced-landing been contrived, that the aeroplane was undamaged beyond a trifling injury to its alighting gear, while Capt. Olley and the photographer were both unscratched. But, whenever he can be induced to recall that incident, Capt. Olley takes no particular credit to himself. The whole thing, he says, simply provides an illustration of how, even in really awkward predicaments, it is possible to put an aeroplane down without damage to oneself, or to anyone on the ground below.

It is wonderful, to veteran air-mail pilots like Capt. Olley, to compare the early days of civil aviation with our highly-organized air routes of the present day. Capt. Olley was one of the first pilots on that pioneer London-Paris air-mail which, as we have already described, laid the foundation of British aeroplane transport; and there was an early trip of his on that history-making service which will always linger in his mind. And it is hardly surprising that this should be the case, seeing that on this occasion he made as many as seventeen forced-landings after ascending from London, and before he managed to reach Paris; while by the time he neared the French capital it was so dark that he could not find the proper aerodrome, and had to finish up as best he could in a football field! Constant trouble

with the petrol feed of his engines was the problem he was grappling with that day, and it meant that after perhaps a few miles flying he had to alight and pump petrol by hand from one tank to another. It was an experience, says Capt. Olley, which, if one looks at it in the right way, provides another example of the controllability and inherent safety of the flying machine, because in each of those seventeen compulsory descents he had no difficulty in finding a suitable field into which to glide and alight safely; while in every instance, also, he managed to fly out of that field again without the slightest mishap.

Seventeen forced-landings on one flight from London to Paris, finishing up in a field just as it was getting dark! That gives one some idea of the difference between air-mail flying years ago and the operation of the modern flying mail, when the dependability of our multi-engined mail-planes is such that our latest British figures for all-the-year-round reliability stand as high as just on 100 per cent.

It was on another occasion, during the comparatively early phase of London-Paris air transport, that Capt. Olley had one of the oddest experiences which has ever befallen an air-mail pilot. He was flying from Paris to London one evening in a big twin-engined mail-plane of a type now obsolete. Beside him, in the roomy cockpit, sat his engineer, while behind them, separated from the cockpit by a sliding door, was a cabin in which there were half-a-dozen passengers. It was a pleasant summer evening, and everything was going according to plan. They were punctual to the minute, and the big machine was humming through the air with hardly any movement to show them that they were in flight. Capt. Olley was sitting with the control-wheel in his hands, and with his feet on the rudder-bar, peering out

forward and then giving a glance over his instruments, as becomes a pilot's habit on such regular flights. Also —again by force of habit—he leaned back presently and took a look along the body of the machine behind him; and it was as well he did so, for an amazing sight met his eyes. One of the windows of the cabin, located just over the bottom wing, had been pushed wide open, and a man passenger was half out of this window, striving apparently to leap from the cabin in mid-air. Pilots need to be alert when at the controls of an aeroplane; but, as Capt. Olley confessed afterwards, he certainly found this situation an astonishing one. Whatever happens, however, the need is for prompt, decisive action, and in this case it was an easy matter for Capt. Olley's engineer to slide open the bulkhead door and dash through into the cabin—which, at a word from the pilot, he did instantly. As he rushed into the cabin he found several of the other passengers struggling with the man, who was still trying to force his way through the window. One arm and leg this astonishing person had, in fact, already succeeded in getting outside, but the remaining arm and leg were being gripped, frantically, by a couple of his fellow-travellers. Capt. Olley's engineer, a strong fellow, quickly got to work, while Capt. Olley himself, out forward, thought it best to pilot the mail-plane down towards an intermediate station which lay a few miles ahead. Before he had reached the ground the struggling passenger had been dragged back into the saloon, and was being held in a more or less dazed condition in one of the armchair seats. Immediately Capt. Olley had landed the mail-plane, he went through himself to interrogate this amazing passenger, and found him apparently in his right senses again, and full of abject apologies. He said, in answer to Capt. Olley's questions, that he was

afraid he could not account for his extraordinary conduct, except to say that an impulse which he had found it impossible to resist had suddenly caused him to try and get out on the wing of the machine, as he had apparently seen pictures of trick-pilots doing. Well, what could one do in a case like that? The most important thing, from Capt. Olley's point of view, was to continue his flight promptly, as he had mails as well as passengers on board; but, as he said afterwards he certainly did not fancy having that passenger up in the air with him again. So the air-station officials arranged that, as soon as this eccentric person had pulled himself together a little more, he should continue his journey by surface transport.

It is when discussing such an incident as this that Capt. Olley emphasizes—and other mail-plane pilots corroborate him—that of all the mental attributes of the flying man the most essential is that he should concentrate when up in the air—that he should be ceaselessly on the alert. By this it is not meant that he has to sit at the controls in a state of nervous tension—far from it, because if he did he would soon get tired, and it would be impossible to carry out, comfortably, any really long flight. No; it is not in the least a question of having one's nerves on the stretch. As a matter of fact, as these mail-pilots explain, you want to relax at the controls of an aeroplane just as one needs to sit easily at the wheel of a car. But what one must cultivate up in the air is an attitude of quiet, never-ceasing watchfulness. And the pilot has plenty to do, even though his machine itself is so easy to fly. He has his map and compass to keep an eye on, so as to make sure he is steering an accurate course. Then there are the instruments on his dashboard—such as his speed and height indicators, and others which tell him all he wants to know about

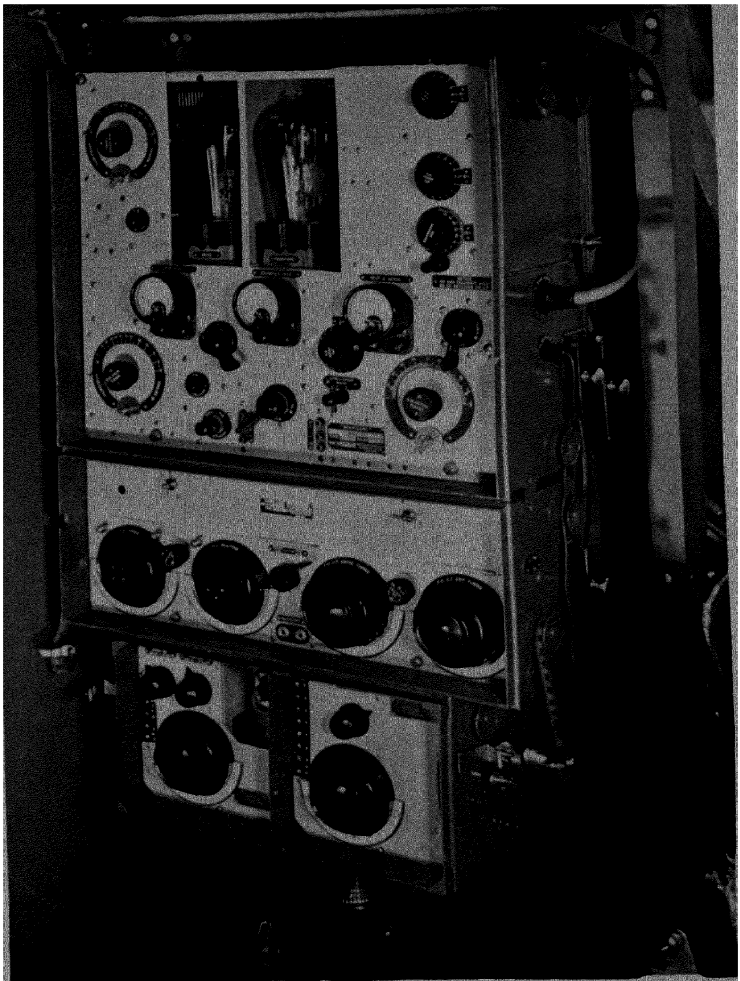


Photo. by courtesy of Marconi Company

The latest wireless equipment, as installed in one of the big Atalanta monoplanes of the Empire air-mail. The top section is the transmitter, and the middle section the receiver, while the smaller section at the bottom is the "homing" device which is described in these pages

the running of his engines. Then, of course, he has to keep an eye out for other aircraft; while constantly his eyes rove over the panorama of land, sea, or coast below. Every now and then, too, the mail-plane pilot will cast a look round over his machine just to see that everything is all right—more particularly when he is flying one of the big multi-engined machines, and has a number of passengers in the saloon behind him.

In addition to their regular trips along scheduled routes, air-mail pilots have frequently to undertake special charters, flying off at a moment's notice in any direction; and it is the dashes of such air-mail "specials", chartered in circumstances in which the time-factor is of vital consequence, which often provide stories which are dramatic and strange. Sometimes, also, they have aspects which are amusing, and in this latter category falls one of the trips figuring in the flying log-books of Capt. Olley. The story concerns a wealthy and very impulsive magnate who was about to entertain a party of guests at a large and beautiful estate on the continent. There was an open stretch of grass-land near the mansion, and he had chartered a big, luxurious 'plane, of which Capt. Olley was the pilot, to take his friends up on pleasure trips above the surrounding country. Capt. Olley flew over from London a short time before the party was due to assemble. Not having visited this particular spot before, he circled round once or twice with a view to discovering whether the proposed open space would, or would not, make a suitable temporary aerodrome. Certainly it was large enough, but as Capt. Olley looked down again he saw that an old farmhouse and some out-buildings on the fringe of the field might—in view of the direction of the prevailing wind—prove a serious obstacle in taking off and in alighting with such a big machine as he was flying. He mentioned this to the

magnate after he had landed in a neighbouring field, and had walked over to the mansion to talk things over.

"Come out with me at once," said the magnate in a quick, imperious way which was characteristic, "and show me this obstruction."

Capt. Olley promptly did so.

"And if those buildings were not there the ground would be suitable—is that so?" he questioned.

"Certainly," Capt. Olley assured him.

"Well, then," observed the magnate, with one of his rare smiles, as if enjoying the situation, "a little difficulty like that must not stand in our way. It is true that I do not own those buildings—yet. But what I shall do now is to buy them instantly, and my agent will be instructed to obtain the necessary labour, working in day and night shifts, so that they can be pulled down before the time comes for our little flying party."

And, that point settled, he hurried off indoors again to grapple with business problems which, from his point of view, were no doubt very much more important; the buying and pulling down of a farmhouse, just to facilitate an afternoon's flying for his guests, being merely a detail in the grand scale on which he was accustomed to do things.

It may be added that the farmhouse *was* purchased immediately, price being no object; after which gangs of labourers appeared from all directions, and those buildings vanished in clouds of dust, almost like pieces of stage scenery.

Veteran pilots of the air-mail are often asked what they consider has been their most difficult flight. Capt. Olley, when that question is put to him, has vivid recollections of an air dash which he made with a business man from Spain to England. This passenger was desperately anxious to reach London for an urgent

appointment, and begged Capt. Olley to start even though reports as to the weather among the mountains they would have to cross were the reverse of encouraging. Capt. Olley's policy, and that of his fellow air-mail pilots, is "safety-first" always. The more experience a pilot gains, the more foolish it seems to take unnecessary risks. But on this occasion Capt. Olley was flying a fast, powerful machine, and, knowing the route extremely well, felt that if his passenger did not mind being tossed about a bit, in the "bumps" over the mountains, there should be no special difficulty about the flight, and that it would be a case more of personal discomfort than of risk.

"Go ahead," said the passenger promptly, when the position was explained to him. "What I want you to do is to get me to London without an instant's avoidable delay."

Well, that was good enough for Capt. Olley, and off they started at more than a hundred miles an hour. All went well till they found themselves among those mountains, and then they encountered conditions which were the worst Capt. Olley, even with all his flying experience, had ever met with before. The wind began to blow in great gusts of really phenomenal force. Then they encountered squalls of driving rain which, as they climbed to pass over the mountains, turned every now and then to sleet and snow. The wind, too, seemed to grow even stronger—if that was possible—while the "bumps" they encountered, in the rushes of air over and round the mountain-peaks, were simply colossal. Recalling those moments, Capt. Olley says he has never, before or since, experienced anything like them. At one moment he was flying at about 12,000 feet. Then, an instant or so later, he found himself in a violent descending wind-trend which swept him down to not more

than about 7,000 feet. It was the grimmest battle with the weather he has ever had, and he has had a good many—wind, rain, sleet, and snow, with great masses of racing cloud which, while the aeroplane was sweeping through them, reduced visibility almost to vanishing point.

Ice and frozen snow began to gather on the wind-screen, and along the wings of the machine. Mountain-peaks loomed up around and below. The wind blew with what appeared to be ever-increasing violence. But the powerful engine of the mail-plane continued to run smoothly, and each time the machine was swept down, Capt. Olley managed to regain height again, and to struggle a little farther towards the calmer conditions he knew would be found on the other side of the mountains. While it lasted, however, that was a gruelling, exhausting experience, and more than once Capt. Olley thought of the passenger in the saloon behind him, and wondered what sort of weather he was making of it. But he need not have worried, because just when this battle with the elements was at its worst a little sliding-door between the saloon and the cockpit was pushed open, and a hand was thrust through offering the pilot a sandwich! In spite of the raging gale, and of those ominous mountain-peaks yawning just beneath them, that passenger was calmly enjoying his lunch! This, no doubt, was an evidence of his confidence in Capt. Olley's pilotage; but the airman was a little too much occupied, just at the moment, to do justice to that proffered sandwich. It should be added that Capt. Olley won through all right to London, and that this business man, thanks to the speed of the aeroplane, managed to pull off a big deal—while as for Capt. Olley, well he added just a few more hundred miles to those many thousands he had already flown along routes stretching away across Europe and beyond.

The post Capt. Olley now holds, and it is one of the most interesting that could be imagined, is that of Chief Special-Charter Pilot to Imperial Airways. It means that he has to be ready, at any moment, to ascend in a specially-chartered 'plane on a flight say to Paris, or to fly with a party of big-game hunters who may be bound as far as Central Africa. Nowadays the aeroplane, by the sheer speed of its flight, can solve for us problems in our daily lives in a way that would be impossible by any other means. Not only, in fact, when we send our urgent letters by aerial mail, but also when, in some emergency, we need ourselves to make a journey with the utmost speed, the fast-flying modern aircraft proves a boon indeed. The other day, just to take one example among many, a French Judge staying in London arrived at Victoria to find that the boat-and-train service had been cancelled which was the only one to get him back to France in time for the opening of his Court. It was in this predicament that a message was flashed through to the London air-port at Croydon, and an air-taxi was made ready immediately. In this the Judge was able to fly across to Douai in ample time for his court-opening ceremony. In another case, recently, a schoolboy who had to sit for an examination in Norfolk missed at Liverpool Street Station the only train that would get him there in time. His father promptly hired a special 'plane, which alighted in a field close to the school, the boy taking his place and passing the examination successfully.

Looking through the records of the special-charter department of Imperial Airways, you find the drama and romance of everyday life—a business man making an air-dash to catch an ocean liner; a doctor flying to a sick-bed abroad; a newly-wedded couple starting on their aerial honeymoon. And only the other day, to

illustrate the strangeness of some of these special charters, a widow hired an air-taxi, sitting alone in its cabin, just in order to fly across to France and lay a wreath upon a grave.

The scope of the air-mail special is widening constantly. Not long ago a party of critics flew from London down into the country to see the first performance of a play; while the other day the head of a big business firm, opening a new branch in the provinces, chartered a large mail-plane to take down a party of his guests, serving them with cocktails while in the air from the buffet of the machine.

We are familiar enough with the urgency of the wireless S.O.S., and in connection with some of these broadcast messages, nowadays, specially-chartered aircraft play their part. Recently, for example, a holiday-maker in the Channel Islands heard, one evening, an S.O.S. summoning him to the bedside of a relative who lay dangerously ill at a point far-distant in the south of France. Whereupon there followed a day-and-night dash by flying-boat, train, aeroplane, and car. A flying-boat took that traveller over to the mainland. Then he went on by night mail-train, following this by a swift air journey across the Channel and over the continent, the final stage being accomplished by fast car. And the result of this rush by air and land was that the bedside of that sufferer was reached just in the nick of time.

Almost every day, now, Imperial Airways officials pick up their telephones to hear urgently-worded calls for specially-chartered aircraft to fly off, at a moment's notice, at a pace more than twice that of surface transport. The other morning a wealthy merchant arrived in a taxi at Euston just in time to see, steaming out of the station, a train connecting at Liverpool with the boat

in which he had booked a passage to West Africa. It was imperative that he should catch the boat, but he found upon hasty inquiry that no other train would get him there in time. What did he do in this emergency? Why, the only thing possible. Hastening to a 'phone-box, he called up Imperial Airways, and by the time he had motored down to Croydon an air-taxi stood waiting for him with its propeller already revolving. Jumping into its comfortable saloon, he sped off through the air, and reached Liverpool in ample time to catch his boat.

Politicians and financiers, nowadays, are carried to urgent conferences by aeroplane. Archæologists are flown to excavation work among lost cities in the desert, while a feature of modern special-charter air work is the transport under doctor's orders, and in aeroplanes specially-equipped, of patients who are too ill to bear the fatigue of a journey by surface transport. Here the skill of the pilot, in the handling of a machine, and in his choice of altitude to avoid bumpy conditions, is of vital importance. Capt. Olley, for example, has made a special study of such work, and has piloted many stretcher cases, with complete success, in flights between London and various parts of the continent, including the south of France. He employs, when required, a saloon-plane containing a bed mounted on springs to absorb vibration, the machine also providing accommodation for a doctor and nurse who may be flying with the patient. Here is a typical case in the use of such a machine. It was desired, not long ago, that the sufferer from a grave spinal complaint should be moved from London for treatment abroad. The shocks and vibrations of a long journey by land and sea would probably have been fatal; but, lying in the aeroplane saloon, on the special bed with its shock-absorbing springs, this patient flew in perfect comfort high above the Channel, accomplishing

in 2 hours what would have been a long and, in the circumstances, dangerous journey by boat and train. The use of a flying ambulance is, as a matter of fact, growing greatly in favour among physicians desiring to send sick people across the Channel to undertake various forms of treatment. It is found that patients can undertake a smooth, swift aerial journey when their condition would prohibit any idea of surface travel.

Another life-saving aspect of special-charter air work lies in the transport of surgeons in cases where the time-factor is urgent. Here, again, Capt. Olley has many triumphs to his credit, having achieved high-speed dashes enabling surgeons to carry out operations which, but for the aeroplane, they would have arrived too late to perform with any hope of success.

The air-traffic experts of Imperial Airways are ready for any and every emergency. The other day, as not infrequently happens, a wireless message came from a big liner approaching Cherbourg from America. It was from a business man who wished to reach London for an important appointment in great haste. Promptly a taxi-plane was dispatched from London to Cherbourg. After alighting there, the pilot went out to the liner in a fast motor-boat, took his passenger aboard, and brought him swiftly to land. Then he was transferred to the waiting 'plane, and in an astonishingly short space of time found himself gliding down at Croydon, with a motor-car waiting to bring him up to his hotel in the West-End.

Another instance of high-speed work was provided recently when an urgent parcel, consigned to America, arrived one evening at the London air-port in one of the big mail-planes. Within a few minutes of its arrival it was transferred to a waiting air-taxi and flown from Croydon as far as the Old Sarum aerodrome where,

just as night fell, it was transferred to a fast motor-car and rushed on to Plymouth. Arrived there, it was put aboard a speed-boat, which dashed out just in time to catch a liner outward-bound for New York. By this use of aeroplane, motor-car, and speedboat, several days were saved, as compared with normal means, in the arrival of the parcel at its destination in the United States.

Some of Capt. Olley's most pleasant recollections, looking back over his air career, concern the famous people it has been his privilege to pilot on flights extending sometimes for thousands of miles. And here he feels he has no hesitation in saying that the most considerate, as well as the most enthusiastic, of all his air passengers, has been his Royal Highness the Prince of Wales. Capt. Olley had the honour of acting as the Prince's pilot when, in one of the big mail-planes of Imperial Airways which he had chartered, His Royal Highness flew home over the last stages of his journey from South America. The Prince not only loves flying as a swift method of transport, but he himself can pilot an aeroplane with judgment and skill. When he takes one of his journeys by air he is not content to remain seated in his armchair in the saloon. When His Royal Highness charters an air-liner in this way, he has not been long in the air, as a rule, before he jumps up and makes his way through to the cockpit, taking his seat beside the pilot, and interesting himself keenly in every aspect of modern aerial navigation. Being an expert pilot, what interests him particularly is the system of wireless communication, between an aeroplane in flight and ground stations, which has now been brought to such a pitch of perfection in airway working. On the flight just referred to, when Capt. Olley piloted the Prince on his return from South America, a capital instance was provided of the value of wireless. Bad visibility—that

airman's bugbear unless he has wireless to help him—dogged their aerial path. But, being as he was in constant touch by wireless telephone with the control-tower at Croydon, Capt. Olley came through accurately to schedule, and without a moment's doubt as to his position above the obscured face of the earth below. The Prince, sitting with the pilot for long spells in the cockpit, followed attentively each phase in this application of modern science to aerial navigation; and after Capt. Olley had landed him at his own private aerodrome in Windsor Great Park, the Prince spent some time in discussing the technical development of commercial aviation. His Royal Highness is enthusiastic in his belief in the future of aerial transport. He has made a close and personal study of the evolution of the flying machine and is, in fact, British aviation's best friend.

Another well-known British air-mail pilot, Capt. O. P. Jones, has also had the honour, on more than one occasion, of piloting air-liners in which the Prince of Wales has flown as a passenger. On one of these trips, when Capt. Jones was bringing the Prince back to London, after a visit which His Royal Highness had paid to Paris, there was so much fog about that surface transport was being impeded considerably. But that did not delay the flight of the big multi-engined mail-plane in which the Prince was travelling. Capt. Jones, after leaving Le Bourget, went right up above the fog into a zone of clear air, and there flew steadily in the direction of London, being in touch every few minutes with the Croydon aerodrome, and being informed that conditions in that particular neighbourhood were quite suitable for landing. So the machine accomplished its flight accurately to schedule, although trains and boats were being delayed seriously.

Capt. Jones has the distinction, as an air-mail pilot, of having spent more than 8,000 hours aloft, while during one busy spell, on a demonstration tour in Scotland, he carried 3,116 passengers for short flights during a period of three days. It was in 1917 that this airman entered the field of aviation, when he underwent a course of flying instruction at Shoreham; after which he put in approximately 550 hours flying on various types of Service aircraft. Resigning from the R.A.F., Capt. Jones started an air venture of his own, and with an Avro three-seater he flew about 800 hours, taking passengers up for joy-rides and giving exhibition flights. For a time he was with Mr A. J.—now Sir Alan—Cobham and, on joining the Instone air line, he flew just on 1,000 hours as a pilot on the early continental air routes; while it was in 1924 that he joined Imperial Airways.

Bearded and imperturbable is this redoubtable pilot. He is a born airman, just as other men may be born seamen; and wonderful is the moral effect of a pilot like this on passengers who, making a flight for the first time, may be just a little bit nervous. After he has taken one of the big Imperial Airways mail-planes off the ground, and everything is functioning smoothly up aloft, Capt. Jones will, after a time, relinquish control to the assistant pilot and, opening the door leading from the cockpit to the saloons, stroll through just to see that everything is all right from the passengers' point of view, and that the catering arrangements, as carried out by the stewards, are proceeding with their usual efficiency. The sight of that sturdy, bearded figure, master so completely of the situation, acts just as beneficially on nervous air passengers as does a glimpse of an ocean-liner captain upon nervous passengers at sea. One look they give at that reassuring figure, calm and smiling, and dismiss at once their qualms. A word here and there,

a glance at the work of the stewards—who may be serving luncheons as the air-liner wings its way above the Channel—and the Commander walks back into the cockpit. It is all part of his routine, this. He is as at home up in the air as other people are on the ground.

And now meet another of these wonderful pilots of the flying mail. Here, just entering the pilots' room after he has brought a big 14-ton mail-plane to earth in one of those perfectly-judged landings for which he is famous, is Capt. A. B. H. Youell. Keen upon flying from boyhood, Capt. Youell was apprenticed, when he was fifteen, to one of the early flying schools, beginning his air career with the very humble task of mending punctures in the tyres of aeroplane wheels. Capt. Youell learned to handle a biplane when he was sixteen. Then the war claimed him, and he was soon out in France, fighting enemy aircraft; after which, when hostilities ceased, he threw himself enthusiastically into civil aviation. And now, having worked his way right up from being an apprentice to the Commander of a great modern 2,200 horse-power mail-plane, he can look back over more than 7,000 hours spent in the air, during which he has flown well over 600,000 miles. Just such a romance, this, as those of the sea, with boys rising from humble beginnings to be captains of their craft!

There is a story about Capt. Youell which the air-mail officials will tell you. On one occasion, in early days, just after he had taken a mail-plane off the ground at Croydon, the airway controller in his tower, watching the machine ascend, saw to his consternation that something had gone wrong with the undercarriage, and that one wheel was hanging down useless. In a flash he called up Capt. Youell on the wireless telephone, and drew his attention to what had happened.

Whereupon the pilot decided to return at once, and make the best landing he could on an undercarriage which had only one wheel! Aerodrome officials held their breath as he came gliding cautiously in, holding his machine in the air until the last moment, and tilting it so that the weight, at the moment of impact, came on the one sound wheel. And such an amazingly smooth landing did he contrive, even under such conditions as these, that one old lady, when she emerged from the cabin, being quite unaware that anything out of the way had happened, asked in surprise :—

" Surely we can't have got to Paris already ? "

And now here into the air-mail pilots' room comes Capt. W. Rogers, who is quick-tongued, irrepressible, and known to his friends as " Rodge ". Rogers was in the army when war broke out, but soon joined the air force and gained his wings. He was posted to No. 10 Squadron of the R.A.F., serving overseas until, in 1917, he was transferred to No. 11 and later to No. 12 squadron. In 1920 he joined the Handley Page Transport Company, and flew just on 1,500 hours as a pilot of those twin-engined mail-planes which were the forerunners of our giant multi-engined aircraft of to-day. Capt. Rogers joined Imperial Airways on the amalgamation of the air companies in 1924. He has, at the present time, flown for more than 6,700 hours.

A genial, stalwart " veteran " of the air-mail, and one of the best-known figures in the pilots' room, is Capt. A. S. Wilcockson. Joining the R.A.F. at the beginning of 1917, Capt. Wilcockson completed 580 hours flying before demobilization in 1919. Then, for several months, he acted as pilot on the Folkestone-Cologne air-mail service. In 1919 he joined the Handley Page Transport Company, and carried out demonstration work for them in Poland. He started regular flying on

the continental air-mail routes on his return from Poland in November, 1919, remaining with the Handley Page Company until joining Imperial Airways. During this period he completed 1,750 hours flying. Famous as a test-pilot as well as the commander of a modern air-liner, Capt. Wilcockson carried out the first aerial experiment with that wonderful safety device, the "auto-slot", which prevents the risk of uncontrolled dives or spins should an aircraft lose flying speed. Capt. Wilcockson is the holder of a commercial air record on the London-Paris airway, having piloted a big mail-plane between the two capitals at a speed of 175 miles an hour. Altogether, since he began to fly, Capt. Wilcockson has spent 7,500 hours in the air.

Another British air-mail pilot of immense experience is Capt. F. Dismore. He gained his official certificate as an airman as far back as 1913, and has been flying ever since. Capt. Dismore was in the Royal Engineers when, in 1912, the Royal Flying Corps was formed, and was one of the first to volunteer for service in the air corps. When the war broke out Capt. Dismore found himself at Newcastle, engaged in pioneer air reconnaissance work, seeking out German submarines. Soon after that he was out in the fighting areas in France, but after a time was recalled to England in order to act as an instructor, there then being a great need for instructors. But in 1917 he saw considerable active service again, having three enemy aircraft to his credit, and being decorated by H.M. the King of the Belgians with the Order of Leopold. On demobilization Capt. Dismore turned to commercial flying, joining the Handley Page Transport Company, with which organization he remained until the amalgamation which brought Imperial Airways into being, and for Imperial Airways he has been flying ever since.

A British air-mail pilot who began flying in 1918 is Capt. L. A. Walters, and prior to joining Imperial Airways in 1924 he had some 1,100 hours in the air to his credit. Six hundred of these had been with the R.A.F., 500 with Handley Page Transport, over the continental air routes, and 25 with the R.A.F. Reserve. Now, at the present time, Capt. Walters has completed over 6,500 hours flying, most of it having been carried out over the continental air routes. Another airman who gained considerable experience as a pilot, in the early days of civil aviation, is Capt. H. H. Perry. For some years prior to 1922 he was acting as a pilot with Handley Page Transport, and subsequent to this he was employed for five years with the Aircraft Disposal Company at Croydon as a test-pilot. He joined Imperial Airways in 1927, and has now flown about 6,500 hours.

Another of our air-mail pilots, Capt. A. R. Prendergast, first went to sea in H.M.S. " Malaya " as a midshipman in 1916. In 1922 he left the Navy as a Lieutenant, joining the R.A.F. and serving seven years at home and in India, where he took part in the Kabul evacuations in 1928, being in fact the pilot of the first machine to land at Kabul. Prior to service in India, he was with the Fleet Air Arm, where he gained considerable experience in deck landings with Fairey " Flycatcher " aircraft. In March, 1930, he left the R.A.F. with the rank of Flight-Lieutenant, and later in that year joined Imperial Airways, serving on the North African section of the Cairo-Cape Town air-mail since its inception.

Two British air-mail pilots of long flying experience are Captains Horsey and Drew. The former has flown for more than 8,000 hours, and the latter—who is now piloting big air-boats on Mediterranean sections of our Empire routes—well over 7,000. Capt. J. Spafford, another of our flying postmen, began his aerial training

at No. 1 Flying School, Netheravon, in 1923, at the age of 21. Immediately prior to joining Imperial Airways, he was attached to No. 99 Squadron, R.A.F., where he gained a considerable amount of experience in piloting large aircraft, flying for more than 100 hours by night. At the present time Capt. Spafford has flown for approximately 4,500 hours.

An air-mail pilot who first began his flying with No. 58 Squadron, R.A.F., and who was subsequently transferred to No. 2 Flying Training School, is Capt. G. J. Powell. In 1930, after considerable flying experience in a varied selection of aircraft, both by night and day, he transferred to the R.A.F. Reserve and joined Imperial Airways, flying for them on the European air-mail routes. To-day his flying hours number over 2,500. Capt. R. O. O. Taylor began flying in 1925 at the age of 20, undergoing a course of instruction at No. 1 Flying Training School at Netheravon, and then became attached to No. 58 Squadron, R.A.F. Later he was transferred to No. 33 Squadron, and then to the R.A.F. base at Calshot. In 1930 he joined Imperial Airways, flying on the Empire service in Egypt and the Sudan. At the present time he has flown approximately 2,000 hours.

Sometimes, even in these days of regular, routine flying, strange experiences come the air-mail pilot's way; and one of the strangest, not long ago, befell a airman who is one of the quietest occupants of the Croydon pilots' room—Capt. G. L. Thomson. For it was he who, as a contrast to ordinary airway operation, was given the romantic task of taking out a big 'plane to act as an aerial transport between mountain-mines and the sea-coast in New Guinea. Many trips he made successfully. Then one day, in a storm of phenomenal violence, he crashed into a mountain-slope. Deadly



The airway traffic controller in his tower at the London air-port

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snakes haunted the jungle depths. Cannibals lurked in the forests. Perils abounded on all sides. It was ten days before the airman, abandoning his wrecked machine, struggled back to civilization at his sea-coast base. But will he talk about that episode? Emphatically not. It isn't the air-mail pilot's way. And yet, in that wonderful air-line between the mines and the coast, in far New Guinea, every thrill of the writer of fiction is now being eclipsed by actual fact, and living men are enacting, day by day, a drama which in its sheer romance rivals the glamour of a super-film. For there is gold in it. There are grim jungles. There are dangers to daunt the stoutest heart; while, adding a final touch to this moving tale, there is the modern flying machine, soaring with its gleaming wings where men have never passed before. And it is all true! It is all happening! It is a great and heroic effort of actual life—an effort which, crowned as it is now by success, opens up prospects almost dazzling for exploiting the vast, hidden resources of our mighty world.

Most of us, at one time or another, when reading some tale of adventure, have come across those intriguing words "Guinea Gold", conjuring up visions of the hoards of precious metal hidden within the primeval forest of that mysterious island of New Guinea in the East Indian Archipelago; an island which even to-day is largely unexplored, with birds of paradise in its virgin forests and strange dwarfs and pigmies in the undergrowth beneath. A "treasure island" truly, because the gold is there. The problem, in fact, is not so much to locate this gold as to find means for operating any mine, and for transporting ore and supplies through forests so dense that it is dark even at mid-day in the thickest parts of them, and up precipitous mountains with the added dangers of foaming torrents and lurking

foes. Rich gold was struck a few years ago at Wau, in this wonderful territory; but the goldfields lay far back from the coast, with the intervening forests and mountains proving an almost insuperable barrier. Of roads there were none—nothing, in fact, save native trails, and these twisted up perilously through the jungle. It took more than a fortnight, in fact, for native bearers to carry a few pounds of stores from the coast to these mountain-mines, and, rich though the yield of ore promised to be, the problem seemed hopeless until, in a flash of inspiration, someone suggested an aeroplane. No sooner said than done. A landing-ground was cleared at the sea-coast, and another away up in the mountains. Then a machine was brought from Australia; and one morning it soared swiftly above mountains and forests, and effected in less than an hour, with effortless ease, a toilsome, dangerous journey which had previously been occupying more than fourteen days!

The miners away up in their lonely clearing, hedged in by the unyielding forest, cheered when that 'plane came gliding down. And no wonder, because they saw that their problem was solved—as, indeed, it was. More aeroplanes were obtained; bigger machines carrying heavier loads—regular "flying lorries". An airway was established between the sea-coast and these distant mines, the aircraft becoming the only regular link with civilization, and loads amounting to thousands of tons being air-borne to and fro. Even a small hotel, arranged cunningly in sections, has gone up by this magic "sky-way" to the settlement far above; to say nothing of pianos, billiard-tables, and such-like amenities. And the natives peer up in awe, from their forest glades, at the coming and going of "the great white birds".

A few years ago Wau was a tiny, inaccessible village, buried in virgin forest. To-day it is a busy settlement, containing something like 1,000 white men, together with several thousand natives, their needs being supplied unfailingly, day in and day out, by this " magic carpet " of the air-line, which triumphs over every barrier Nature can impose. In some ways this story is the most wonderful flying has ever told us ; wonderful not only in its achievement but also in its implications—because it means so much. Away in Peru, for example, there are mountain-mines which it is now proposed to work solely by aerial transport ; while in many other parts of the world the airway, operated by big machines carrying heavy loads, and passing unimpeded above mountains, forests, deserts, or trackless wastes, opens up possibilities which are almost illimitable. Within the British Empire to-day no subject is more vital than that of settling men in remote areas where natural resources merely await development. And now here we have this " open sesame " of the pioneer air-mail line, saving any necessity for immediate and costly work upon ground organization, and removing at a stroke that feeling of isolation which is engendered by slow and tedious earth transport. Flying, as a civilizing agency, offers us much in the days ahead, but in no respect will its story be greater than in the help it will give us to tap the hitherto untouched resources of this wonderful world.

CHAPTER XII

HOW AIR TRAFFIC IS CONTROLLED

Checking the position of mail-planes in flight—Routine signalling from the air—Position-finding by wireless—Seeing the unseen—Night-lighting equipment—The "neon" beacon—Importance of the engineering department—Designing and building a mail-plane.

IT is a memorable experience, when one is at London's air-port, to climb above the roof of the main building and enter the control-room in which the officer on duty is directing the air traffic, just as those at a railway terminus control the movement of trains. Immediately in front of the airway controller, in this outlook room of his, with its big windows, one observes a specially-prepared map with a number of little flags dotted here and there across it. Each of these represents the position of a mail-plane in flight. After he has ascended, and at intervals during his flight, a pilot calls up the control-tower on his wireless telephone, thus enabling the traffic officer to keep an accurate record of the progress of each flight. Immediately after an air-mail pilot has left the air-port, he will call up the control-tower, giving the operator a routine message specifying the registration number of his machine and the air-port on the continent for which he is bound. On leaving the sea-coast, to fly across the Channel, the pilot will give Croydon another call, informing the control-tower of his point of departure from the English coast, and of the spot for which he is steering on the other side; while on arrival over the French coast he

will again report his position. All such messages come through to wireless operators who are busy in a compartment adjoining that of the aerial traffic officer. Each message is passed to him; whereupon he alters the position of one or other of the little flags on his map, thus being able to see at a glance how many machines are in flight along the continental routes, and how many are nearing Croydon. Outgoing and incoming aircraft follow prescribed routes, while whenever he thinks it necessary the airway traffic controller can call up the pilots of machines in flight and indicate any special course or height which the conditions of the moment may make desirable. It may happen, for example, that visibility becomes bad just while several machines are about to make a Channel passage. In such a case the controller at Croydon, scanning his map, will know which machines are likely to be approaching each other. Whereupon, by means of the wireless telephone, he will ring up the various pilots and instruct them to maintain different altitudes, so obviating any possibility of their getting too near each other.

One of the most remarkable aspects of modern airway traffic control is the power which wireless confers upon those in the tower of telling some distant pilot exactly where he is, even if at the moment clouds or fog should prevent him, as he looks down from his cockpit, from identifying landmarks. This position-finding by wireless has now been brought to such a fine art that in less than a minute, after he has called up the control-tower and asked to be told where he is, a pilot flying many miles away can be informed of his exact position above the obscured face of the ground below. Wireless position-finding, when you see it done, is as simple as are many other of these apparent miracles, and we shall have an opportunity of explaining the process in detail in our next

chapter, when dealing with an actual flight in one of the big mail-planes.

While one is in that lofty control-tower, up there above the Croydon 'drome, one seems to have passed from the world of to-day into that of to-morrow, because that chamber, with its maps, wireless instruments, and other mechanism, is the forerunner of giant structures, replete with even more intricate apparatus, by which the air-mail traffic will be controlled which passes out across oceans as well as continents and which, ultimately, spans the entire globe in swift, unfailing flight. Up in that magic tower, thanks to the modern miracle of wireless, one might say that one can see the unseen; while the sound of human voices reaches one constantly from far-off in the clouds. These magicians up in their tower, working quietly and without haste, know everything that is happening on the airways that radiate from London. Though some big mail-plane may be rushing high above the earth, hidden from the view of earth-folk, these men know where it is and how its flight is progressing. They not only know this, but they are constantly aiding that pilot, as he flies, with weather reports and wireless bearings.

It is one of our greatest triumphs, this—the perfection of the wireless telephone in its application to aerial transport. From that lofty tower words flash out into the void, and are heard by the air-mail pilot who sits in his cockpit poised somewhere above mid-Channel, or rushing between London and the coast. And not only does he hear that voice but, simply by the turn of a switch, he himself can converse freely with that far-off tower. Constantly this wireless talk goes on between earth and sky, annihilating all such restrictions as man has laboured under hitherto. The conquest of the air seems wonderful enough as, looking down from

the windows of the tower, you see passengers entering and disembarking from great winged machines which now cleave their way along aerial highways just as freely as trains rush upon their tracks beneath. Then, as one turns and listens to what goes on in this aerial wonder-room, it seems a climax to man's ceaseless efforts to free himself from the bonds that fetter him, and to enter that era in which the words " time " and " distance " cease to have the limitations they have imposed since the world began.

Most imagination-stirring of all is the experience of being up in that tower as the light fades and night comes on. The controller leans over and moves certain switches. Instantly there leaps into life the flash of the aerial light-house, and the far-off gleam of boundary and obstruction lights. On, too, just before a mail-plane comes in to land, flashes the great flood-light; and then down in ghostly fashion the winged craft glides, navigation lights gleaming. It is man's conquest of the air epitomized!

As you stand up there in the tower, and watch the airport lights come on, the most striking feature of the system is the intensely brilliant " neon " beacon. This is composed of a large number of " neon " tubes, and the red, intensely penetrating light which these give has been found particularly useful, from a flying point of view, in piercing mist or fog. Air-mail pilots report that they can see the " neon " beacon when a long distance from Croydon, and that it shows up extremely well in conditions of bad visibility. Apart from this " neon " beacon, the air-port lighting includes a number of small red lights which outline the boundaries of the aerodrome, and indicate the position of obstructions such as the roofs of buildings. These red pin-points of light, twinkling in all directions, look extremely picturesque;

but even more striking, when it comes into operation, is the great flood-light already mentioned. The purpose of this powerful light—a special type of search-light—is to cast a wide, low beam over the alighting area, thus facilitating the descent of night-flying craft. The searchlight is mounted on a mobile truck and can be moved to any point on the edge of the landing-ground, throwing its beam in the direction in which a pilot may come gliding down to alight, always remembering that a machine is brought in head-to-wind. So great is the power of this flood-light that it will give an illumination equal to about 75 per cent. of daylight over a wide stretch of the alighting-ground. Its employment forms an essential part of the night-landing scheme.

Another very instructive experience, when one is visiting London's air-port, is to go through the sheds in which the mail-planes of the various air-lines are housed ; and the size of these sheds may be judged when it is stated that in their main sections there is now room for more than thirty big aircraft. Very complete and efficient is the system which has been evolved for the overhauling and maintenance of the mail-planes employed on the various services, that adopted by Imperial Airways having been declared the finest of its kind in the world.

Night and day, at the present time, is the Engineering Department busy upon the maintenance of the mail-planes which are in use. Machines which have been inspected and overhauled are passed out regularly to the Traffic Department ; while other big craft, having completed their journeys, are coming in for routine inspection and overhaul. The sheds are, in fact, a scene of well-ordered, never-ending activity. Nothing is left to chance. No detail is overlooked. The system is intricate and smooth-working, meeting every contingency which may arise. Directly an air-liner has

alighted, and its passengers have left the saloon, the machine passes into the hands of one of the Inspectors of the Engineering Department. Each engine is tested carefully to make certain that it is running with full efficiency; after which, when the machine has entered its shed, any general adjustments which may be necessary are carried out immediately. Then there is a second inspection and report before the mail-plane is passed out for its next aerial journey. Each air-liner, before being granted its daily "airworthy" certificate, is subjected to a complete routine inspection. The Inspectors who grant these certificates, or daily permits to fly, are licensed by the Aeronautical Inspection Department of the Air Ministry, and their licences are renewed annually after rigorous examination. Ground engineers, as well as Inspectors, are licensed by the Air Ministry. In addition to the inspections made after each flight, every mail-plane, and every engine, has to undergo a complete overhaul after a stated number of hours flying. It is not until one has visited these sheds and workshops at the air-port that one realizes how vital a part ground organization plays in the safety and dependability of the modern air-mail.

Another thing that strikes one, when examining the aircraft in the sheds at Croydon, is the way in which recent developments in air transport, owing to the need to carry heavier mail-loads, and to provide still greater comfort for passengers, have tended to the employment of machines of increasing size, power, and weight-lifting capacity. In the design and construction of the modern mail-plane certain main considerations have, first of all, to be borne in mind. The operators of the air-mail may say to a designer, just by way of preliminary; "We now want a machine to carry so much mail and freight, and so many passengers, at such-and-such a speed." Whereupon the designer reviews, in general terms, the technical

questions which arise. As a matter of fact, the design of any big mail-plane, nowadays, is a very carefuly-considered, ingenious compromise—as, indeed, is almost any other piece of modern engineering. Science is emphasizing more and more the need to " streamline " any aircraft, which means the adoption of shapes offering the least possible resistance to their own swift progress through the air. Equally important, from an airway traffic manager's viewpoint, is the provision of hulls of such a shape and size as ensure saloons of adequate width and height for the accommodation of passengers in comfort. And it is here that one reaches the essential compromise. Designers find it imperative to allow an ample height and width of hull, in order not only that passengers may sit at ease, but also that they may be able to get up and move about while the aircraft is in flight—walking over to the buffet, for example, and enjoying a cocktail while passing high through the air. Infinite pains are, therefore, taken not only to " streamline " big modern air-hulls so as to lessen resistance, but, at the same time, to allow an increasing amount of space for the travellers who will be accommodated in them.

In aircraft, particularly, there must not be any of what engineers call " idle metal ". Everything must be extremely strong, with the amplest margins for abnormal strains. Yet everything that can be lightened must be lightened. And it is here that one enters a remarkable field of specialized modern construction. Take, for example, engines which have been developed for aerial use. Their reliability is wonderful. Yet they give smooth, dependable power with an astonishingly small weight-factor. Then there is the adoption of light-weight metals. Special aluminium alloys are employed ; while methods have also been evolved whereby corrugated spars and ribs of high-grade steel can be given amazing

lightness, combined with astonishing strength. Aircraft constructed throughout of metal are, in fact, now appreciably lighter than similar machines of wood.

After the preliminary designs for a big new mail-plane have been produced, models are built and rough full-scale replicas erected of such parts as control cabins and saloons. Every aspect of the weight of the completed structure is studied with minute care, because the paramount requirement in aircraft intended for regular commercial, air-mail service is that they should carry a maximum of paying load for any given horse-power. In the case of new British mail-planes, intended for use say on the routes of Imperial Airways between London and the continent, or from England to Africa and India, and on towards Australia, the case in design and construction of their manufacturers, and the trials they receive at the hands of expert test-pilots, are re-inforced by a Government system which is aimed, scientifically, to safeguard air travellers in every possible way. Each new air-liner, after its preliminary trials, passes into the hands of the Air Ministry at a Government station. Here it is subjected to a complete series of official trials. Its constructional system is examined. Every aspect of its performance, when under aerial tests, is observed and recorded, and it is not until any machine of a new type has been thus examined, and re-examined, and reported upon in every way, that it is given its Government certificate, and licensed officially to carry a certain specified commercial load which must never be exceeded.

One day, in due course, a big new mail-plane comes into service for the first time on one of the scheduled routes. But that aircraft is new only to the passengers who make their first trip in it, and admire its luxurious equipment and smooth passage through the air. To the air-mail experts, and to the Government officials, it is

a very familiar piece of work, seeing that they have studied it in every detail not only during its period of design and construction, but also during its technical flying trials. There is, indeed, nothing unknown about that craft. It is a tried, tested, completely " airworthy " product, long before the day comes for it to set out with mails and passengers say for Paris or Cologne, or on the first sections of flights which may continue, stage by stage, for thousands of miles across the Empire.

No romance of modern aviation is greater than that of the growth of our long-distance flying mails. Into the G.P.O. in London come thundering the foreign-bound mails. Bags beyond number are unloaded, and go up to the huge sorting-rooms. Here sit experts at their frames, letters by the thousand passing through their nimble fingers to find places in pigeon holes above. And every now and then there comes a dramatic little pause. A letter appears which bears in its corner a small blue label. Only three words that tell-tale label bears, but they are words which cause the letter bearing them to be separated instantly from its fellows, and started upon a journey which, even in these days of wonders, kindles one's imagination merely to contemplate it. " By Air Mail ! " So reads that little label. And it is an " open sesame ", nowadays, to aerial voyages above seas, deserts, mountains, and forests—away across Europe eastward for thousands of thrilling, fascinating miles. The keynote of that tiny label is, indeed, speed and still more speed. Not a moment is lost. In from the provinces come eleventh-hour mails. Up to the last moment the busy sorters are at work. And then down to Croydon, by fast motor-van, go these bags of letters which bear the little blue label. Out on the airway departure platform stands the big multi-engined mail-plane which is now our modern " magic carpet " between

mother-country and Dominions. No longer, now, are those Dominions weary weeks distant. In a matter merely of days, by aeroplane and flying-boat, mails flash from country to country and from continent to continent.

As they go into the air-liner's hull those mail-bags epitomize, in themselves, the wonders of modern Empire air transport. For Palestine, for Iraq, for Baluchistan, for India—so the names are called. Nor is this all. For there is also, of course, that great trans-African air-mail, and bags arrive at the air-port which are air-bound for Khartoum, Kenya, Tanganyika, or Cape Town.

Up on the control-tower the hands of the clock are now at the hour of departure. The last Empire mail-bag has been stowed away, and the big mail-plane taxies out and in a minute or so is vanishing above the hills on its way to the coast. Across Europe go those aerial mails, and on by flying-boat above the Mediterranean. Then eastward go those for India, and southward those for Africa ; and in our next chapter—as a fitting continuation of a subject which is so engrossing—we propose to ask readers, in fancy, to accompany the pilots of some of our air-mails, as they fly high above land and sea.

CHAPTER XIII

IN THE COCKPIT OF A MODERN MAIL-PLANE

Leaving earth for air—" The world above the clouds "—Panoramas of land, sea, and sky—Looking down on Europe from an air-saloon—Magic of Empire air travel—Studying wild life from aloft—The bird's-eye point of view

NOW picture yourself actually in the control-cabin of one of our big British multi-engined mail-planes, just about to start off on a flight from the London air-port. A signal from the control-tower tells the Commander of your craft that he may begin his flight. Promptly he taxies out his big machine, and brings it into position so that it is facing into wind. Then he waits for another signal indicating that he may actually take off. When this comes from the tower he opens the throttles of his powerful engines, and the big mail-plane runs smoothly forward until its speed is sufficient for its wings to bear it aloft. Whereupon, by a gentle movement of his control-wheel, the Commander operates his elevators, and the mail-plane leaves earth for air. Below pass the air-port buildings, while away in the distance, seen as a rule mistily, lies the vast city of London. Now the needle of the speed-indicator shows that the mail-plane is flying at just over 100 miles an hour, and beneath, as you look down from the control-cabin, extends a fascinating panorama. Meanwhile the Commander—and the First-Officer who sits beside him at duplicate

controls—settle themselves comfortably for their aerial journey. But ceaselessly, as they fly, they are on the alert. One instant, for example, the Commander will be looking out ahead. The next his glance will sweep the land or sea below. Then his eyes will rove from one to another of the instruments on the dashboard. Among these are the engine revolution counters of the four big motors. There are also oil pressure indicators and petrol gauges; dial upon dial, in fact, which must be kept an eye on. And every now and then the First-Officer enters up the log-book which tells a complete story of every flight. Here, in this log, you will find such details as petrol consumption, engine speed, oil pressure, and height; and these log-books are studied carefully by technicians at the air-port, because they provide an accurate check upon the performance of each of the big mail-planes while in flight.

Your big machine sweeps serenely on and, from its control-cabin, you survey the earth from a bird's eye point of view. Now you are flying towards the Channel with a wonderful vista of Kent unfolding itself below. Then, soon after this, the sea-coast lies below, and you pass out above the Channel. Occasionally, as your flight proceeds, verbal messages are exchanged by wireless telephone with the airway controller in the tower at the London air-port. Let us assume, for example, that your machine is now flying in brilliant sunshine above a bank of cloud, having ascended for the time being into this undisturbed upper air for the comfort of passengers, so as to avoid the "bumps" which might be encountered in the lower zones beneath the clouds. The Commander of your mail-plane, and his First-Officer, have worked out their approximate position but—the clouds obscuring for the time being all sight of the earth below—they seek a confirmation of this; and so the

Commander invokes the wireless telephone, calling into his instrument the words :

" Hullo, Croydon ! Hullo, Croydon ! Imperial XF calling ! Over."

That voice—a voice from the sky—is duly heard by the operator who is listening in the control-tower at Croydon, and in a moment the Commander of the mail-plane hears in his head-phones the words :

"Hullo, XF ! Hullo, XF ! Croydon answering. Over."

It may be mentioned that the word " over " merely indicates that the mail-plane Commander, or the Croydon operator, as the case may be, is moving his switch from the sending to the receiving position ; while the call letters " XF " are simply a brief rendering of the registration lettering of this particular mail-plane, which in full is G-AAXF.

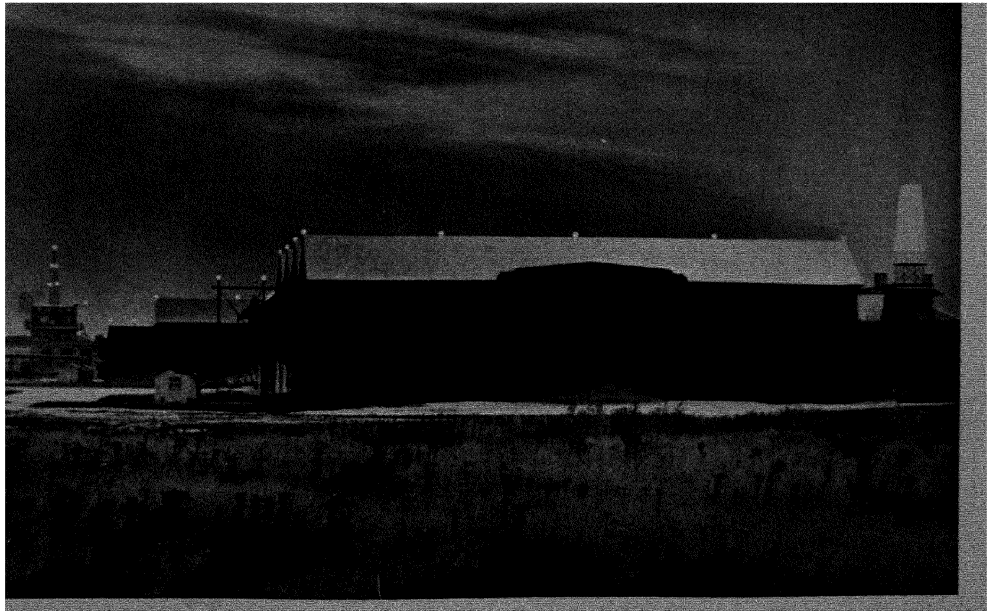
Now your Commander asks for what he wants.

" Hullo, Croydon. Imperial XF calling. Position, please."

After which the routine is this. The mail-plane sends out a continuous signal by means of its wireless generator, and this is picked up, and listened to, by various receiving stations, at each of which, by the use of an apparatus resembling a frame aerial, a wireless bearing is taken upon the distant aircraft. These bearings are then communicated to the control-tower at Croydon, where the operator, plotting them out, knows that where they all meet on the map represents the point above the Channel where the mail-plane is flying at the moment. At which he calls up the Commander of the mail-plane and says :

" You are so many miles from the English coast at——— " as the case may be.

It needs, probably, only a very small movement of the mail-plane's rudders to bring the machine dead on



The London air-port at night. On the right is the "neon" beacon, and on the left the illuminated control-tower

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its pre-determined course, because pilots who fly daily on the continental air routes gain an almost uncanny knack of judging speed and distance even when, for considerable periods, cloud or fog may obscure landmarks below. And, in any case, they have this magic of wireless upon which they can rely. And what a magic force it is, nowadays, is shown not only on the European but also on the Empire air routes. The wireless operators of mail-planes flying along our Empire routes sometimes pick up messages, nowadays, which emanate from points thousands of miles from the spot over which the aircraft may be passing. On the afternoon of Derby Day, 1933, for example, while the Imperial Airways "Hannibal" was flying along the section of the India air route between Baghdad and Basra, the operator heard the wireless message from England which was flashing round the world the result of the classic horse race which had just been run on Epsom Downs. Thus the passengers in the machine, although they were high in the air at the moment above a stretch of desert, learned the result of the Derby within a minute or so of the winner having passed the post. Not long ago, also, another remarkable long-range result, as between an aircraft and a ground station, was obtained while an Imperial Airways machine was in flight along the Africa route. On that occasion, while the mail-plane was between Juba and Kampala, its operator succeeded in establishing contact with the British Post Office station at Portishead, near Bristol, a distance of approximately 4,000 miles.

On another occasion, while a mail-plane was in flight over the African route, its operator succeeded in picking up, and writing down accurately, items of news from a bulletin which was being broadcast from a ground station in Florida. Mail-planes in flight over Africa

have also established wireless contact on several occasions with land-stations in Germany and Italy, while not long ago a machine, using short-wave transmission, and flying from Cairo to Cape Town, succeeded in maintaining communication with Cairo when at a distance of well over 1,000 miles.

But now let us return to the mail-plane in which we assume we are flying, and which has just been obtaining its position by wireless from Croydon. It was reckoned, just for the purposes of this wireless test, that our machine was crossing the Channel above the clouds—which means a wonderful experience for those enjoying it for the first time. Though conditions may be dull and gloomy beneath the clouds, up here in the higher air the sun is shining, and all is bright and glittering to the eye. It seems in fact, as it is often called, " a world above the clouds "—more particularly as the cloud-tops often take the shape of vast mountain-ranges, and sometimes what appears just like a broad road can be seen running up among these queer, elusive cloud-slopes. It looks almost, indeed, like some strange kind of Alpine scenery on a very large scale, and one day a passenger declared that all this above-the-clouds scenery looked so substantial that he felt he could jump from the 'plane and just wander about among those dazzling peaks below. Just as well that he did not do so, though, or he would have found those cloud mountains of a very will o' the wisp character.

As a contrast to such an above-the-clouds crossing of the Channel, your mail-plane will often make its trip between the two coasts through a clear and cloudless sky. Then, far below, you see tiny black specks, which you recognize only as ships by the smoke from their funnels, and the white wake which stretches behind them. They look more like toy boats on a pond than anything else. Sometimes, if the wind happens to be

high during your crossing, there are white caps to be seen on the waves; but often the sea appears like a floor of glass beneath, with scarcely a ripple on it. After which, when the French coast lies below you, and you are on your way to Paris, you are struck as you look below by the difference between the appearance of France and England. You see that the French fields are, as a rule, larger than ours. You note that there are fewer hedges, and that most of the roads are straight; while the French towns and villages are seen to be less straggling than those of England. Then presently a belt of forest extends below and soon afterwards, approaching Paris, the Eiffel Tower—that famous landmark—can be seen pointing skyward. Now the busy air-port of Le Bourget appears beneath. The pilot of your mail-plane throttles down his engines and you begin your glide earthward. Down the great machine comes, until, perfectly handled, its wheels make their contact with the ground, and your pilot has added yet another 230 miles to the thousands he has flown already along the aerial ways. As for the flying passenger, it is not only the effortless speed which so impresses one. It is not only the feeling of complete detachment from an overcrowded earth. It is the fascination of being poised high aloft and of seeing such vistas of air, sea, and land as thrill one by their unexpected beauty.

Voyagers by air-mail, nowadays, talk enthusiastically about their favourite aerial views, just as do travellers who see the world from motor-cars, ships, or trains. Nothing, for example, could surpass the beauty of the scenes one looks down on while flying to Switzerland, more particularly when your 'plane heads up the valley of the Rhine, with the mountains of Germany on one hand and those of Switzerland on the other. On the

mountain slopes villas and farms are dotted picturesquely; while away on one's right, snow-capped and majestic, lie the Bernese and Engadine Alps. Those views from aloft are superb. Nothing mars their sheer grandeur.

Should a flying trip take you along the air-mail route from London to Brussels and Cologne, you will find that after leaving Croydon your pilot heads towards Tonbridge and Maidstone, flying down the valley of the Medway, one striking landmark near Maidstone being that famous Leeds Castle, built in the middle of a lake. Then, leaving Ashford, you see Dover ahead with its harbour and coastal fortifications; while at low tide, as you fly seaward, a view can be obtained of the well-known Goodwin Sands. Soon after this you identify the cliffs of France and then pick out Calais, with its docks and light-house. As you have been flying above the steamer track, there are usually passenger craft and cargo-boats to be discerned far below, their progress being so slow, compared with your swift passage above, that they appear to be standing still. On reaching France you follow the coast, passing Gravelines with its long double jetty; and after this comes the commercial port of Dunkirk. Then, turning more inland, you near Dixmude, one of the famous battle-fields; after which you pass over the Yser Canal. Bruges, with its famous belfry, may be observed to the left; also, not far from Bruges, the great masts of the wireless station which maintains communication with the Belgian Congo. Now Ghent is seen, with its tall churches and large inland port at the end of the canal, and after this you approach Brussels, flying over the Royal Palace, which can be identified by a pagoda in the middle of its beautiful gardens. A fine aerial view is obtained of Brussels, with its Palais de Justice and other landmarks. After a halt at Brussels comes a crossing of the river Meuse. Then you cross

the frontier into Germany, the roads below being marked clearly by their rows of trees, while here and there you see great factories with their high chimneys; after which Cologne, with its world-famed cathedral, lies ahead and you glide down to land.

One point, particularly, strikes the modern passenger who makes his journey by flying mail. It is that no sensation of fatigue is entailed by the speed of flying; no feeling of rush or hurry. Ample time you have to see everything, and for the reason that, when you are looking down from the mail-plane saloon, it does not seem that you yourself are moving at all. Your impression, on the contrary, is that you are poised motionless, and that it is the landscape or seascape below which is in smooth, never-ceasing motion. And this fact, coupled with the absence of noise in a journey in a big modern mail-plane, removes all sense of strain, and one just sits completely at one's ease.

To see Europe from the air presents no difficulties at all nowadays, travel by the many air-mail routes having become so systematized that one can accomplish lightning tours which would have seemed impossible not long ago. Ascending from London, for example, you can fly via Paris to view the scenic beauties of Switzerland; while from there, if it pleases you, another big mail-plane will waft you to Vienna. On again, you can devour distance till you find yourself in Berlin; after which, still passing high above the earth with effortless ease, you can wing your way back to England via Holland and Belgium. Europe passes below you like a kaleidoscope. The world, with all its vivid contrasts, lies at our threshold in this age of the aerial mail, and journeys become possible which are the most intriguing any traveller could make. You view the earth from angles which are new and strange. You

have the joy of an experience which leaves you thrilled in mind and unfatigued in body.

On the world's chief air routes, nowadays, the big mail-planes are carrying hundreds of thousands of passengers a year, and a dominant impression of all such travellers, when they descend from their voyages through the air, is of the fascination of their aerial point of view—a fascination all the more enthralling when one looks down on the wonders of such great air-lines as those stretching as far as India and Africa. One's imagination, in fact, is stirred merely by the contemplation of some of these voyagings, high above the earth, which travellers now accomplish with so much unconcern—talking, reading, or playing cards while their great mail-plane rushes smoothly above land and sea; its stewards not only serving breakfasts, luncheons, teas, and dinners while aloft, but being quick also to point out landmarks and beauty spots on the earth below.

When, one afternoon not long ago, the air-mail from Africa reached the London air-port, a passenger who descended from the mail-plane's saloon was explaining to some friends who had come to meet him how, with journeys now shrinking from weeks to days, the impressions of a flying voyage come so vividly one upon another.

"Less than a week ago," this traveller was saying, "I was looking down from the air on elephants, buffaloes, and giraffes. And now I am in London. Talk about 'magic carpets'! Why, here you have one in actual fact! Africa, as you fly across it, passes below in a vast, ever-changing panorama—hills, mountains, and rolling plains, alternating with forests, lakes, and rivers; a scenic pageant one is never likely to forget."

The other day, too, when one of our big mail-planes came gliding in to Croydon with Empire mails, passengers,

and freight, one of its occupants was a London business man, representing a number of enterprises with connections overseas, who had just returned from a flying trip of 20,000 miles, during which he had paid aerial calls on clients in Palestine, Egypt, Iraq, Kenya, Uganda, Tanganyika, Rhodesia, and South Africa. The time occupied in this voyage by air had been eighty days, as compared with 180 days had the traveller gone by surface transport. And he found that to "drop in" on clients from the air proved a thoroughly effective way of promoting business. A good many of them, according to arrangements which had been made by cable, came out to meet him at stations where the mail-planes were scheduled to halt; and while the big machines were refuelling they adjourned to the aerodrome hotel for a meal and a chat over business. They said they found this an excellent idea. Time was saved, the crux of the matter being reached promptly. Such air-station interviews also had the effect of side-tracking such formalities as are apt to prove irritating, sometimes, in the more hackneyed routine. Doing business by air, in fact, introduces new and helpful factors into trade relations, and this particular business man returned to London satisfied that he had accomplished far more, by travelling by air-mail, than he would have done had he been content with slower forms of transit. Air travel is so up-to-date. It impresses those with whom one has to deal. They recognize that "time is money" so far as you are concerned, and they themselves, in consequence, are in a frame of mind which induces them not only to do business quickly, but also to take an optimistic view. It is a question of psychology, this. The speed and novelty of air-mail transport, with all the possibilities it opens up, create an atmosphere in which it becomes easier to do business. Certainly, from the

personal view-point of any business man, flying is ideal. Across Africa, for instance, it makes simply all the difference between comfort and discomfort. Flying in one of the big mail-planes, you escape heat, dust, fatigue; which means that you reach your journey's end fresh and vigorous, ready at once to plunge into the matters on hand. In fact the business man already mentioned, after returning from his Empire aerial voyage of 20,000 miles, put the matter in a nutshell by saying:

"On all counts the tour by air-mail scores. You save time. You avoid fatigue. You benefit in health and mental outlook from a fascinating experience, and you return with more business in your books than you could possibly hope for if you failed to invoke the assistance of this 'open sesame' of air-borne trade."

Wonderful, truly, is the time-saving of the flying mail. And no instance could be more striking than that which was provided, soon after the institution of the London-Cape Town service, by the voyage of Major Ewart S. Grogan, D.S.O. It was Major Grogan who, so far as is known, and more than thirty years ago now, was the first man to travel direct from the Cape to Cairo. That journey, made before flying had dawned upon our horizon, took him nearly three years to accomplish on foot. But by the air-mail he flew in not more than thirteen days right through for 8,000 miles from London to Cape Town. Which led him to write enthusiastically:

"This is a glorious endeavour—annihilating time, bringing us within sight and thought of each other, turning over a new page, and confounding those who cry that romance is dead."

Major Grogan's experience in time-saving reminds one of the trip of a farmer in Africa. A year before the coming of the air-mail this farmer had been called upon

to make a journey which, without going into detail, one may say had occupied him for sixteen days by car. Then, not long ago, he had occasion to make this same trip again. But now the air-mail gave direct access to the point he wished to reach, and in just six hours, by flying, he accomplished the journey which, only twelve months before, had taken sixteen days. Six hours as compared with sixteen days! No wonder those in Africa look upon the air-mail as a tremendous boon. One may recall that it was a dream of Cecil Rhodes, that great Empire pioneer, to forge a chain of communication across the 6,000 miles of Africa between Cairo and Cape Town. In those days, naturally, he thought in terms of a railway. But now to-day that dream of his has finally borne fruit, not in any system of surface transport, but in the shape of our great Cairo-Cape Town air-mail, which has already become an integral part of the daily life of the African continent—which is a " dark continent " no longer in these days of high-speed aerial communication. General Smuts, when he came over to the Economic Conference in London, chose the air-mail as his means of transport quite as a matter of course and, on arrival in London, spoke in the highest terms of its speed, comfort, and reliability. Business men, too, not only use it regularly for the acceleration of their urgent correspondence, but employ it without hesitation when they themselves want to travel between Africa and the home country. There is one manager of a big concern in Africa, for example, who before the advent of the air-mail could not find time to come to London more than once every three years. Now, however, he is arranging to attend each annual meeting of his company in London, flying to and from Africa in the time it used to take him to make a single journey by surface transport.

In the traffic growth on our Empire air-lines no aspect is more striking, nowadays, than that of the increase in the number of passengers who, when travelling to and from either India or Africa, now make their journeys in the big aeroplanes and flying-boats of the aerial mail. It is not only speed and reliability which are provided on these long air routes, but a high standard of travelling comfort also. It needs to be remembered that, though passengers are air-borne to India in six days, or to Cape Town in ten, such speed does not entail any of the fatigue associated with night travel. Every evening passengers alight at some convenient air-port, finding there everything they need in the way of comfort until the time comes to ascend next morning; and such nightly breaks in a long journey rob it of monotony or fatigue. One has time to explore romantic cities. One secures close-up views of far-off lands, in addition to seeing them from the air. The time-saving of the long-distance airway is, in fact, accomplished not in any breathless rush, but in stages which give one ample time to see all there is to be seen. And that there is plenty to interest one on the ground, during an Empire flight, as well as when one is in the air, was shown during the aerial voyage made not long ago, from Karachi through to London, by Lady Willingdon, wife of the Viceroy of India. On alighting at Sharjah, one of the halting-points on the Arabian side of the Persian Gulf, she was entertained with much picturesque ceremony by the Sheikh of Sharjah, who is himself an ardent believer in flying, and who some time ago made a trip to Baghdad by the Indian air-mail. Lady Willingdon was invited by the Sheikh to visit him at his imposing fort, where he was surrounded by his followers, and where Arab sweets and coffee were served, and a grand salute of guns fired from some ancient cannon outside

the fort; after which, for the further entertainment of his distinguished visitor, the Sheikh and some of his retainers gave a superb exhibition of horsemanship.

Another Arabian ruler who takes a keen and practical interest in aviation is the Sheikh of Koweit, whose domain lies at the head of the Persian Gulf. It was he who, not long ago, flew by the Indian air-mail to pay a visit of ceremony to the Sheikh of Sharjah, afterwards returning to Koweit by air, and being welcomed by great throngs of his followers, armed with long-barrelled rifles.

Royal travellers, as well as statesmen and other distinguished folk, now make it a habit to fly by air-mail whenever they are traversing routes which are served by aerial transport. The King of the Belgians, for example, who not long ago flew to and from the Congo by Imperial Airways, honoured the Company again, just recently, by using their service between Brindisi and Gaza; while the interest which His Majesty takes in air transport was further evidenced when, at his own request, one of the new Atalanta-type monoplanes of Imperial Airways was flown to Brussels in order that he and the Queen, and the Duke and Duchess of Brabant, might fly in the machine from Brussels to Antwerp and back. Not long ago, also, Prince Leopold and Princess Astrid flew from Juba by the air-mail while on an African trip.

Another Royal patron of the air-mail just lately, was His Majesty King Feisal of Iraq, whose keen interest in aviation is so well known. His Majesty, when making his journey to England, used a specially-chartered Imperial Airways craft to carry him from Baghdad to Cairo, being accompanied on the flight by nine members of his staff. And, while one is describing such flights, mention should certainly be made of a recent trip by

an American traveller, Miss Allison. After leaving New York by sea transport, she flew from Cairo to the Cape by Imperial Airways, and then back to Johannesburg and Durban, afterwards crossing to India by steamship. From India she flew by Imperial Airways to Brindisi, and then in the Graf-Zeppelin airship from Europe across the South Atlantic to Pernambuco. After which she continued her tour via the Pan-American Airways to Miami, and by Eastern Air Transport to New York, the tour totalling approximately 20,000 miles, and being regarded as a particularly interesting illustration of how a women passenger, travelling alone, can now fly in comfort over practically all the big air-mail lines of the world.

Another very enthusiastic aerial traveller is ex-King Ferdinand of Bulgaria. Not long ago his Majesty made a flight over northern Africa by Imperial Airways, accomplishing in thirty-six hours a journey which, some years before, had taken him twenty-six days. One thing which, he said, impressed him particularly was the moderate temperature which it was possible to preserve in the air-liner saloons even when flying through the tropics, and he declared, on completing his trip, that there was only one way in which to make such a journey in comfort—and that was the airway.

All this being so, it is not surprising to find, as is shown by figures which have become available, that during the early months of 1933 60 per cent. more passengers flew by the African air-mail than was the case for a corresponding period in 1932; while mail-loads had increased by 50 per cent., and air-borne freight by as much as 58 per cent. Actually, during a recent period of just over twelve months, more than 3,000 passengers have made aerial journeys by the African air-mail.

Each Wednesday this famous air-mail for Africa leaves the London air-port, passing high above the Channel to

Paris; after which a train link accomplishes the stage from Paris to Brindisi. Here you find awaiting you one of those fine Scipio-type flying-boats of Imperial Airways, which combine speed and comfort in a way which wins the admiration of all passengers. From Brindisi across to Alexandria your trip provides a splendid panorama of the Mediterranean, with its wonderful vistas and coastal beauties; after which you begin to wing your way above the romance and wild life of the great African continent.

The sky is deep blue, and there is a gentle breeze from the desert, as you make your early-morning start from Cairo and, as your mail-plane climbs, the Pyramids stand out below you amid the golden sands; while far beneath lies the famous Nile, herd-boys tending their goats along its banks. And so you sweep on—on past the Valley of Kings, with the hotels of Luxor coming into view. The Nile still lies below, while temples and ruins—panoramas of a remote, mysterious past—unfold themselves beneath. As Assuan appears ahead you catch a glimpse of the First Cataract—a splendid sight when viewed from aloft, with the Assuan Dam beyond the foam of the rapids. Another marvellous view, while you are en route for Wadi-Halfa, is that which you obtain of the giant temple of Abu Simbel, with its enormous figures guarding the entrance; while it is as you near Wadi-Halfa that the scenery below changes from fertile river valley, bordered by inhospitable, wadi-scarred plains, to arid desert. After a halt at Wadi-Halfa you are in the air again, and now, for mile after mile, as you look below, there is nothing but the sand of the desert. But it is not long, however, thanks to the speed of your mail-plane, before you reach Atbara en route for Khartoum, and observe that cultivated areas are beginning to appear below, with glimpses here and there of cotton-fields. And then, ahead of you where the White and Blue Niles meet, you see Khartoum with its wide, well-planned

streets, and with the native village of Omdurman straggling just across the river. Khartoum is one of your night halts, on the aerial journey across Africa, and this gives you an opportunity, which you are glad to take, of riding along the Embankment, of seeing the Palace where Gordon lived and died, of visiting the Zoological Gardens, and also of catching some interesting glimpses of native life as it is lived in Omdurman.

The next stages of your flight find you sweeping onward, still above the Nile, with river-side villages dotted here and there below, the brown figures of the natives being visible as they move here and there among their huts; while those in your mail-plane who have good eyesight, peering down, may catch a glimpse of crocodiles lying on the river-banks. Kosti is reached and passed: then, as you fly on, grass-land and bush country begin to appear. And so you reach Malakal, tribesman from the river-banks gazing at your craft. On, still on, your mail-plane flies, its pilot steering now for Juba, where you are scheduled to spend the night. As you look down you see vast swamps passing away below; while every now and then the black back of a hippopotamus may appear on the surface of the river far beneath. It is hereabouts, also, that elephants roam. From a great height they may not be seen; but if your mail-plane is flying fairly low you may glimpse a herd beneath. One of the thrills of flying over Africa is provided by the game, far beneath, which one can watch from one's cabin window. Not long ago Sir Harry Brittain, K.B.E., C.M.G., made journeys to and fro along the African airway, during which he studied animal life, taking many photographs of special interest. The fascination of such animal studies from aloft, declares Sir Harry, never palls. Always there is something fresh to see. From the cockpit of the big mail-plane in which

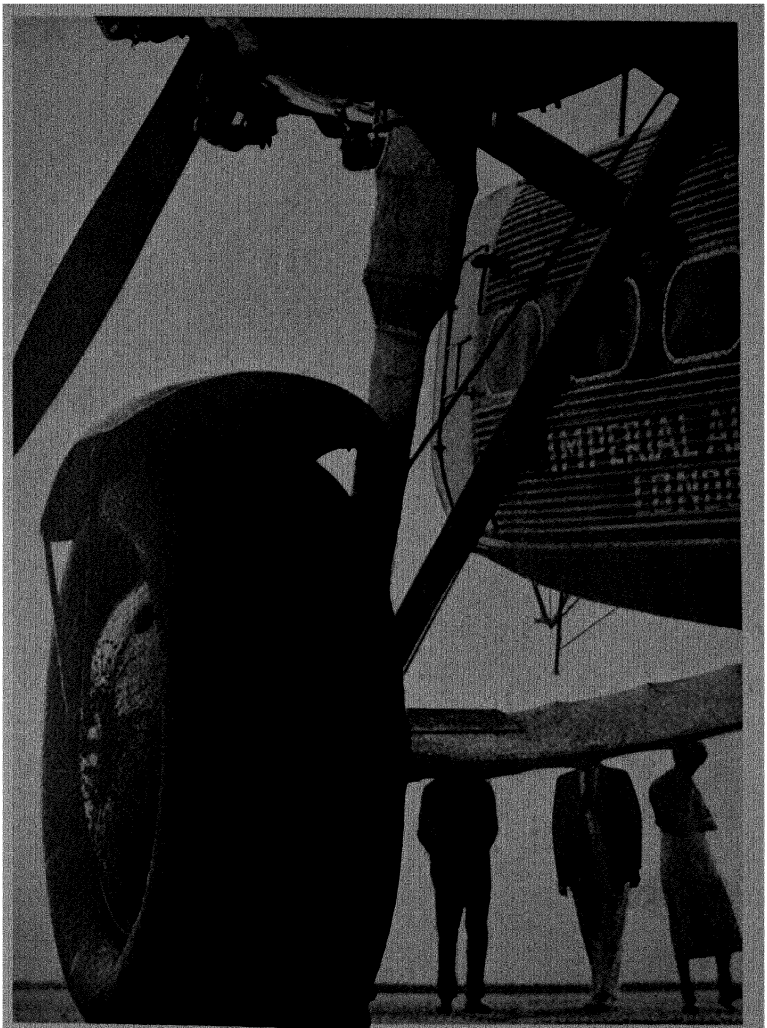
he flew, he obtained some splendid photographic studies of animals in their natural surroundings. Amazing, indeed, is the variety of the wild life one sees from above in Central Africa, now only a few days away from England by the aerial mail. It is a veritable paradise of game—elephants, rhinoceros, wildebeest, giraffe, zebra, and different types of the antelope tribe. One thing, particularly, struck Sir Harry Brittain during his flight over the game lands. It was this. Nature has camouflaged animals wonderfully, with their speckled and dun-coloured coats, so as to make them hard to detect, amid their natural surroundings, when viewed from ground level. But they have no such immunity from those who come on them by way of the air. When you are flying above the bush, any moving object can be distinguished easily.

Sir Harry Brittain was privileged to fly out to Cape Town in one of the new four-engined monoplanes which are now being used on the African air-mail, and which cruise at 120 miles; and one day he had a striking illustration of the sheer speed of aerial travel. As they were flying southward over Central Africa at two miles a minute, Sir Harry caught sight of a big eagle winging its way towards them. In a flash the bird came from the horizon and passed their 'plane. The combined speed of mail-plane and eagle must, at that moment, have been at least 180 miles an hour. But from his place in the cockpit of the 'plane, using his pistol camera, Sir Harry just managed to get a photograph of that eagle before it vanished in the distance.

As to some of the general impressions of his 16,000 miles of flying from London to Cape Town, and then back again to London, Sir Harry Brittain feels that Africa is a great country with a vast future, and he is certain that the trans-African air route will, as traffic along it develops, become one of the most vital of all the world's aerial

highways, stimulating trade and accelerating progress. In the near future, he is convinced, there will be a very great increase in the number of English tourists visiting Africa by air. The airway, he points out, is still in its infancy so far as the loads it carries are concerned, rapidly-growing though these are: while one also needs to remember, when viewing coming progress, that there is now a generation growing up which is entirely air-minded, and which will adopt aerial travel just in the same way as transport by land or sea. With the development of the air-mail, Sir Harry believes that Kenya will, in a few years, become a favourite pleasure-ground for English people, being reached in just a few days from London in big luxurious air-liners. In summarizing his conclusions, this distinguished traveller says:

"I made my flight to Cape Town and back with the chief object of studying at first-hand the actual operation of Empire air-mail transport. And no subject is more important, not only from the point of view of what has already been accomplished, but also from that of the developments which now impend. Soon, for example, we should have an air-mail right through to Australia, and after that an ocean service of big flying-boats between England and Canada; and so on till the whole Empire is linked by air-mail. The Imperial Airways route across Africa has already won the admiration of the world. It has made accessible the inaccessible, and its safety and regularity are possible only as a result of splendid organization, combined with the very best human material available. The spirit which animates its directorate also pervades the entire staff. Its airmen and engineers are the finest the world of aviation can provide. The air-mail pilots take no chances. Their business is to bring in the mail on time, and to do so safely; and one has only to study, as I did, the actual records of flying over this



The mail-plane of 1933—a study in size and power. This photograph, taken from just behind one of the great pneumatic-tyred landing-wheels of one of our latest type four-engined British air-liners, and with the front of the metal hull towering above, gives a striking idea of the size and solidity of these 14 ton giants of the air

African route to realize how well Imperial Airways, and the men who serve them, keep to schedule week after week and month after month. It is a triumph of modern enterprise, this, if ever there was one, and it is a triumph which has an importance that is now almost incalculable in quickening those communications which are the keynote of inter-Imperial progress."

That the African airway is indeed a " triumph of modern enterprise " will be readily agreed by all those who make actual journeys by it. On above those great game-lands which Sir Harry Brittain mentions your big mail-plane flies, until presently Juba lies ahead. Here is another of your nightly halting-points. Next morning, when you ascend again, glorious panoramas stretch as far as the eye can see. You have, for example, magnificent bird's eye views across Lakes Albert and Victoria, with lofty mountains beyond. And so via Entebbe and Kisumu you reach Nairobi.

Next day, still speeding southward above Africa, you find yourself over the great and splendid forests of Tanganyika, a memory-haunting sight, near Moshi, being that mountain of Kilimanjaro—forest-clad, majestic, and with its lofty summit capped by snow. " Monarch of Africa ! " So Kilimanjaro is called, and it is such a landmark that pilots of the air-mail can see its towering heights, sometimes, when they are 100 miles or more away. After a halt at Dodoma, you fly on to spend the night at Mbeya, where Imperial Airways provide all the comforts of modern travel : after which you sweep on above Rhodesia, land of vast mineral and agricultural resources, with Salisbury—one of its chief grain centres—as your next night stop.

Southward from here, as you look down from your mail-plane, you find yourself gazing over wide, rolling plains, with mountain-ranges here and there. Bulawayo,

built round its market square, soon appears below, and here your machine re-fuels. Then you fly on above magnificent country to that fine and entirely modern city of Johannesburg, centre of the great gold-mining industry; after which, with impressions crowding upon your mind, you ascend in your mail-plane on your final stages to Cape Town, your route now lying via Kimberley, where, it may be mentioned, privileged visitors are sometimes shown half-a-million pounds worth of diamonds on a single counter. On above the plains and mountains of Cape Province your mail-plane flies, the clearness of the air enabling you, as a rule, to see vast distances; and then ahead presently appears Cape Town, the terminus of your 8,000 miles flight, lying superbly between Table Mountain and Table Bay.

There are two dominant impressions which linger in the minds of those who make an air-mail journey over Africa. One is their bird's eye view of that wonderful mountain of Kilimanjaro, and the other the first glimpse which they obtain of Table Mountain, while still perhaps some fifty miles distant. Both sights are so beautiful that they are long remembered.

One of the best-known and most picturesque of the world's air-mail lines! Such is that famous 5,000 miles route which connects England with India, and which will soon be extended still further eastward towards Australia. Its utility is amply evidenced by the traffic growths which are recorded in connection with it, including not only passengers and freight but also mails, an increase which is steadily maintained being shown in the volume of air-borne letters. Each Saturday, at 12.30 p.m., this air-mail from England to India ascends from the London air-station with its passengers, mails, and freight. Luncheon is served while in flight to Paris where, from the Gare de Lyon on Saturday night,

you continue on by sleeping-car train to Brindisi, which is reached early on Monday morning. At Brindisi one of the four-engined flying-boats awaits you, and you ascend at 10.15 a.m. on your first stages above the Mediterranean, being due at Athens on Monday evening. The night is spent at Athens. Then early on Tuesday morning you are in the air again in your flying ship, arriving at Alexandria by mid-day. Then from Cairo, that same afternoon, your flight continues in one of the big land-planes, Gaza being reached in the evening. Here there is another night halt, and at six o'clock on Wednesday morning you continue your flight, this time en route for Baghdad and Basra.

A halt is made at the romantic desert station of Rutbah Wells; after which, crossing above the Euphrates, you glide down above Baghdad itself, "Jewel of the East", catching a passing glimpse, as you do so, of the golden domes of the Kad-i-Main Mosque, and of the narrow streets and date gardens of the famous city. After a short stay at Baghdad you are soon aloft again, obtaining a memorable view from the air of the Arch of Ctesiphon, relic of the Palace of the Parthian Kings, and then approaching the legendary site of the Garden of Eden. At Basra you spend Wednesday night; and then on Thursday morning you fly on down the Arabian side of the Persian Gulf, via Koweit, Bahrein, and Sharjah, the last-mentioned point being a night halt. On Friday the air-mail continues to Gwadar and Karachi; after which, now that the 1,500 miles extension across India is in operation, it flies on via Jodhpur, Delhi, Cawnpore, and Allahabad to Calcutta. The actual flight of 5,000 miles from England to India is accomplished in just six days; which makes it interesting to recall that 100 years ago it was thought wonderful when one of the old sailing ships made a voyage between England

and India in not more than ninety-one days. Six days as compared with ninety-one days! Or, to contrast the aerial mail with the fastest existing surface transport, six days as compared with seventeen days.

Modern air-mail transport is a revelation not only to those in the mother-country, but even more so to those, overseas, who live thousands of miles from England. Hitherto, so far as they are concerned, the home country has appeared far-distant, remote. But now, in these days of the air-mail, it seems almost unbelievably near at hand. And it is not only between terminals, but also in regard to intermediate points, that the long-distance air-mail can prove such a boon. Take, for example, those additional links of the Indian air-mail which are now being forged onward towards Australia. When the air-mail from England reaches Rangoon, as it soon will, it will bring that city within eight days of London, as compared with twenty-three days by surface transport; while Singapore will be reached by air-mail in nine-and-a-half days, as contrasted with twenty-one by surface transport. In the Far East the speed of air transport is generally discussed in its relation to that of the sea, because the next fastest method of travel, after the air-mail, is the passenger steamship. Such vessels cover approximately 350 miles a day; whereas a modern multi-engined aircraft, cruising at 120 miles an hour, will fly three times that distance between dawn and dusk; while if a night-flying organization exists the hours flown during the twenty-four are governed only by the comfort of passengers and the provision of re-fuelling stations.

Anyone who spends some time in the East, studying transport problems, finds people constantly judging time and distance by sea travel, because it is to this that they have grown so accustomed. They reckon the

distance between any two points by how long it would take them if they went by steamer. Nowadays, however, with air transport on their horizon, they find they are having to alter all such notions, because a journey which might take weeks by sea becomes a matter of days by air, while journeys which would be reckoned in days now shrink merely to hours. To give an example of this, one can take a stage such as that from Calcutta to Rangoon. This, by fast mail-boat, takes two days. But by air it can be flown in five hours! And one can find an example even more striking in a journey say from Rangoon to Bangkok. By surface transport you go by sea to Penang, which occupies three-and-a-half days, and then on to Bangkok by train, which takes another one-and-a-half days, making five in all: whereas the entire air journey can be accomplished in four hours.

No wonder, with aerial trips such as these to be accomplished, above seas, rivers, mountains, and forests, that passengers in growing numbers are now taking their seats in big, luxurious mail-planes, and doing their long-distance voyaging high through the air.

CHAPTER XIV

A FINAL REVIEW OF PROGRESS

The world's air-mail routes—How their mileage has increased—The business world and aviation—Atlantic air-mails—Mid-ocean halts—High altitude air transport—Aircraft of the future—The flying wing—Psychological importance of the aerial mail—Girdling the globe by air

WHEN, fourteen years ago, the first mail-planes began flying on pioneer routes, the total mileage of the world's air-lines did not reach a figure of more than about 3,000. To-day, throughout the globe, there are just over 200,000 miles of organized air-mail routes. In the British Empire, at the present time, we have approximately 28,000 miles of regular air-lines, with almost another 20,000 now in process of being planned or organized; while so far as mail-loads air-borne in British machines are concerned, and reckoning from the time, nine years ago, when Imperial Airways began operations, these have grown from thousands of letters a year to annual totals which are now reckoned in millions.

Great trunk air-mail lines, extending for thousands of miles over land and sea, are now carrying ever-growing loads, and mail transport by air is reducing not merely by days, but by weeks and even months, the time taken to traverse long distances in territories where transport is till slow and undeveloped. A romantic example, in this connection, is that of the air-mail which penetrates north of the Arctic Circle,

starting from Alberta, Canada, and reaching as far as Herschel Island, where the Mackenzie river flows into the Arctic. Thanks to this 1,000 miles air-mail, people in these northern wastes now have twenty deliveries of letters a year instead of the twice-yearly service by dog-teams which was all they could rely upon formerly. In spite of the difficulties by which its people have been confronted, Canada manages to pursue a vigorous air-mail policy. Admirable, for example, is the system by which mails arriving by liner from Europe are accelerated by air delivery to great Canadian cities, saving days as compared with ordinary transport. In Australia, too, reviewing Empire progress, air transport has battled bravely against retarding conditions, and there has been an energetic development of long-distance air-mails, operating with consistently high factors of speed and reliability; while in the case of Africa we have seen the splendid co-operation with which Governments, Administrations, and municipalities, along the entire Cairo-Cape Town route, have assisted in many ways, financial and otherwise, to bring this great air-line to the point of practical success which it has already reached to-day.

There is now a great driving force behind Empire air-mail transport, this being the growing belief of business men, as well as of Governments, in the benefits which efficient, well-organized air travel can provide, and it is for this reason, in spite of all difficulties, that plans for further progress are being developed so vigorously. The next big Empire phase, now actually in process of accomplishment, is of course the continuance of the Indian air-mail to Australia, to which reference has already been made. Already, at the time of writing, the service has been extended across India from Karachi to Calcutta, and it is now possible to post a letter in

London for Calcutta, and to receive a reply, in nineteen days which is very little more than the time taken for the single journey by ocean mail. Another air link impends between Calcutta and Rangoon; after which this great trunk route will be extended onward to Singapore, there to connect with the service which is to be operated by Australian air transport between Port Darwin and Singapore.

Westward from England, as well as eastward, air-mail plans are now extending, surveys having already been effected, and other preliminary work accomplished, with a view to operating a regular British air-mail across the Atlantic, connecting with the airway systems of Canada and thus providing, ultimately, new trunk routes on over the Pacific to other parts of the British Dominions. Here, naturally, there are many problems to be studied, such as those of ocean winds and weather; while much attention, also, is being devoted to the type of multi-engined aircraft most suitable for Atlantic air transport under all sorts of operating conditions. Recent researches suggest that on such great ocean air services, when worked on a regular commercial basis, it may be found most advantageous to use varying routes, according to the seasons of the year, southerly courses being taken during certain periods, and more northerly paths at other times. All such problems, though they cannot be solved immediately, will certainly be solved in time, and there are those, well qualified to judge, who do not hesitate now to predict that in not more than a year or so we shall have added to our existing routes a great Atlantic air-mail, joining us with the airway systems of northern America. Many of the problems arising, as a matter of fact, are economic rather than technical, being concerned largely with finance in respect of the organization required. Granted that such economic

aspects can be dealt with, there is little doubt about the ability of experts to cope, in due course, with the technical problems of actually operating Atlantic air-mails.

The success which long-distance air-mail transport has already achieved is certainly a good augury for the solution of future problems, and it provides indeed a remarkable evidence of progress to examine some of the operating details of the world's chief routes as they actually exist to-day. The function of the air-mail is, of course, to save time, and it is from this view-point, therefore, that one needs to study the big trunk routes. By getting its loads from England to India in six days, for example, as compared with seventeen days by the fastest surface transport, the Indian air-mail saves those who use it eleven clear days; while in the case of the London-Cape Town service, flying 8,000 miles in ten days, this represents a saving of seven days over surface transport. Then there is a service like that from Marseilles to Beyrouth, accomplishing in two days a journey which would otherwise occupy seven, and thus effecting a regular saving of as many as five days. Another example is afforded by the route between London and Moscow. Here you now have 1,740 miles accomplished in twenty-nine hours by air, as contrasted with approximately sixty hours by surface transport. Still another splendid example of aerial time-saving is that afforded by the famous American trans-continental flying mail between New York and San Francisco, covering 2,763 miles in twenty-nine hours, as compared with just over four days by mail-train transport. Big time-savings, also, are effected by the Dutch air-mail to Batavia and by the French air and sea route from France through to South America. On this latter service the mail-planes fly from France to northern Africa. Then across the South Atlantic the mails are carried at present by fast

mail-boats, continuing on again by air to Buenos Aires. It is the intention, in due course, to replace the mail-boats on the South Atlantic ocean section by very large multi-engined flying-boats; and this raises the important question of the provision made for re-fuelling big mail-carrying craft when crossing any very wide stretch of ocean. Atlantic air journeys can, of course, as has been demonstrated often enough, be made in non-stop flight; but in such cases, so far, the weight of the petrol carried has precluded machines from carrying anything in the nature of a useful paying load. This whole matter is now a subject for close technical investigation, the aim being to evolve long-range ocean-flying commercial aircraft of special types, embodying an adequate pay-load capacity as well as an ability to lift heavy loads of fuel; while many interesting schemes are also being studied in which it is proposed to establish depots in mid-ocean which will act as refuelling halts for mail-carrying 'planes operating trans-Atlantic services. Here, at present, two different methods suggest themselves. One, with which German air transport is already experimenting in the South Atlantic, takes the form of a special depot ship, equipped specially for its task, which is stationed in any given area, along the ocean track, and to which the mail-planes are guided by wireless. After alighting on the water near this mother-ship, special gear is provided for getting them aboard and, after accomplishing their mid-ocean refuelling, they take wing again and continue on their flight. This method has much to commend it from a practical point of view, and the experiments now in hand will be watched with the greatest interest by air-line operators.

Another scheme, more ambitious and far more costly, is to anchor in mid-ocean a sort of floating island; that is to say, a very large, specially-designed stage, or

pontoon, with a form of anchorage enabling it to be moored even in the deep waters of an ocean, and with breakwaters giving it an ability to ride out heavy Atlantic storms. A series of such stages, which have been designed with great ingenuity by expert engineers shall, it is proposed, be anchored along the Atlantic ocean route between Europe and North America. Actual deep-water tests, with an experimental form of stage, have already been conducted by United States interests, and have been pronounced to be entirely satisfactory, and now the question is mainly one of the creation of an organization to carry out the sheme on the full scale proposed. It is intended that such anchored stages should be something more than mere refuelling depots. Their scope, rather, would be that of a form of completely-equipped floating airway station, providing not only facilities for mooring and refuelling Atlantic-flying aircraft, but also embodying restaurants and other amenities for passengers who cross the ocean by air. They might, in fact, be regarded as a kind of mid-ocean hotel, providing a succession of halts on a flight across oceans, just in the same way as our well-equipped land 'dromes provide halts on a flight say to India or Africa. Naturally a very considerable expenditure of money would be involved in the provision of such Atlantic air-stations; and this, so far, particularly in times such as we have been going through, has been one of the factors militating against the unfolding of the scheme on a practical scale. But one of the proposals now being discussed is that such ocean air-mail halts should be provided on some sort of international basis, Governments co-operating with private enterprise, and the stations being at the disposal of the aircraft of various nations in the same way as sea-ports are at the service of the world's shipping. But, as a matter of fact, this

whole question of regular trans-ocean flying, on any strictly commercial basis, is still so much in its infancy that it is difficult to lay down any hard-and-fast rules as to how it should be conducted, or what actual facilities shall be provided. Considerable importance, particularly from the point of view of the carriage of urgent mails, is attached to experiments which are being conducted in the flight of aircraft at very great altitudes where—provided their engines and propellers are equipped specially for the purpose—they can profit from the lessened resistance of the upper air, and attain speeds which would be impossible in the denser layers of atmosphere nearer the earth.

Such high-altitude navigation entails, naturally, the use of enclosed cabins and the supply of oxygen to an aircraft's crew, and there are still technical problems which require considerable study. But there is a growing volume of belief among experts that in the future the transport of our urgent mails will be effected by specially-equipped high-altitude aircraft, moving perhaps ten or twelve miles above the earth's surface, and cruising regularly at speeds of 300 miles an hour and more; while it is also believed that, as science throws fresh light on many of the problems involved, it will be possible to still further augment the speed of such high-flying machines by manœuvring them into great upper wind-trends which—as high altitude soundings already indicate—attain velocities far greater than those of winds blowing nearer the surface of land or sea. "Trade-winds of the upper air", such high-altitude currents have been called, and if in course of time it is possible for air-mail pilots to profit by them regularly, then the speed of a high-altitude 'plane may be so increased that even trans-ocean flights can be accomplished in a matter of only a comparatively few hours. In fact the

speeds we have seen so far in flying are, according to many technicians, as nothing compared with the speeds we may see ultimately; and there is one great British air pioneer, Sir A. V. Roe, who predicts the flight of an aircraft through the upper air at a speed as great as 1,000 miles an hour. But there is, of course, a great difference between experimental or racing speeds and those which can be attained in regular commercial flying. A racing aircraft, already, will attain a speed of more than 400 miles an hour; but our big commercial aircraft, in their regular daily flying with their loads of passengers, mails, and freight, do not cruise at more than about 100 or 120 miles an hour. The record speed of to-day cannot be the commercial speed of to-day; but to-day's record speed may, quite likely, be the commercial speed of to-morrow. The world, nowadays, demands speed and still more speed. It is impatient of long and tedious journeys. And thus in aviation, the fastest of all our methods of transport, the aim is always to increase speed wherever it can be increased, and a fascinating field for future progress now lies in this question of regular high-altitude navigation.

Some of those who have made a special study, recently, of such questions as these, now foresee our air transport of the future dividing itself into various classes of traffic. There may be a special express mail service, flying non-stop for long distances and moving at immense heights above the earth—the air-mail traffic which crosses oceans. Then there may be a specially fast and de-luxe form of passenger service—the "blue train" of the air, in which very great speeds will have to be paid for in the shape of special fares. Business men and others who are in a hurry are always ready to pay for extra speed, if it can be provided for them, and the air offers an ideal medium for the operation of any specially rapid

type of service, flying at extra fares. Another type of service which is foreseen is a sort of " omnibus " service, operated by very large machines, and carrying a mixed cargo of passengers, mails, and freight. This would be appreciably faster than any form of surface travel, and yet not so speedy as the special express service. It would be a type of machine which would make intermediate halts when working on any long route, picking up and setting down passengers as required. And then, as yet another type of service, there will no doubt be the very large air-freighter, designed with a roomy hull to carry a maximum of useful load. While it may average only a moderate aerial speed, such a machine will, at the same time, be so much faster than any other form of freight service as to be sure of obtaining adequate loads.

All such possibilities as these, and many others, now lie upon the horizon of air-mail transport. The scope of the flying mail is, indeed, well-nigh illimitable. One plan for expediting a long-distance air-mail, particularly when it passes over a number of intermediate points, is to save a series of landings en route by dropping mails by parachute and by picking up bags, without alighting, by the use of a special mechanism which enables a 'plane to swoop down, pass low over the apparatus installed on the aerodrome, and hook up a mail-bag in passing without having to do anything more than temporarily reduce flying speed. Many interesting experiments have been made in this connection, and there is no doubt that, when the demands of traffic require them, such methods of picking up and dropping mails from the air will be introduced, and operated, on a perfectly practical scale.

Another method of mail acceleration to which considerable importance is attached, and in regard to

which many successful experiments have been made, is that in which 'planes are catapulted from ocean liners. Here the acceleration may be of a two-fold character. A seaplane or flying-boat, carrying bags of urgent express mails, can leave any sea-port of departure some time after the sailing of a liner, and overtake the vessel when she is several hundred miles outward-bound say on a trans-ocean voyage. Then, just towards the end of the crossing, when the liner is still hundreds of miles from her port of destination, an aircraft can be catapulted from her upper-deck, carrying the special express mails, and this will mean that the aircraft will reach port long before the liner does; the air-borne mails—having been thus accelerated both at the start and finish of the voyage—reaching their recipients very considerably in advance of any carried in the ordinary way. Such a method of partial acceleration, so far as trans-ocean journeys are concerned, affords a useful and time-saving convenience, prior to the institution of complete shore-to-shore trans-ocean air mails.

In the meantime, and with technical possibilities of all kinds being investigated actively, air transport as it exists to-day has the immediately urgent task of endeavouring, as soon as possible, to establish itself on a normal profit-earning basis, independent of artificial assistance from the State. In this regard it is always a matter of interest to compare the development of British air-mail transport with that of other countries, though such comparisons are as a rule difficult, owing to the varying nature of the methods adopted abroad, and the fact that reliable figures are often unprocurable. There is also the point that air-mail progress can be encouraged and stimulated in various ways—either for example by direct subsidies, or by indirect forms of assistance such as the placing of contracts for the carriage

of mails. Our British system has been well-defined for some time now, taking as it does the form of subsidies arranged on an annually decreasing scale, the aim being that such assistance should be merely temporary, and that as soon as possible our air services should be operating as normal commercial enterprises.

Such data as has been secured from time to time, throwing a general light on British progress as compared with that of other countries, has justified the view that in their support of air-mail transport the British taxpayers have been getting better value for money than those of any other country; and now it is possible, in the light of specific, dependable figures which are available for the year 1932, to effect comparisons between the results obtained, during this period of twelve months, by Imperial Airways and the five regular French air transport companies—Air Union, Farman, C.I.D.N.A., Air Orient, and Aeropostale. This group of French companies—now amalgamated in the organisation "Air France"—flew during 1932 2,040,769 ton-miles, and were paid in subsidy £1,582,480. During the same period Imperial Airways flew 1,987,223 ton-miles, receiving in subsidy £549,950. This represented, in subsidy per ton-mile, a sum of 15s. 6d. for the French lines, as compared with 5s. 5d. for Imperial Airways.

In revenue from passengers, freight, and mails during the year the French air-lines secured £416,395, as compared with £514,491 earned by Imperial Airways on the same basis. This represented 4s. 1d. a ton-mile for the French operations, as contrasted with 5s. 2d. a ton-mile for our British services. The total income of the French companies during the year, including subsidy as well as revenue, was £1,998,875, while that of Imperial Airways was £1,064,441. The general progress of air transport, at any given time, towards its goal of

being able to operate as an ordinary business enterprise, without Government assistance, is to be judged by the percentage of its earned income in relation to the subsidy it receives. This vital figure, for 1932, stood at 48·32 per cent. for Imperial Airways, as compared with 20·83 per cent. in respect of the operations of the French air-lines.

Fourteen years of pioneer air-mail transport have, at the time of writing, just been completed by British civil aviation, and the officials and engineers of our air-mail agree that when civil aircraft first came into use they had, in addition to their speed—which was admitted—to provide satisfactory answers to four main questions. The first was whether aircraft could be operated with a sufficient margin of safety on an all-the-year-round basis ; and an answer to this particular question is provided by the actual record of our British Imperial Airways Company, which since its inception in 1924 has flown 10,798,000 miles, in all kinds of weather, and on Empire as well as European routes, with only six accidents involving injury or death to passengers. The second main question is whether an air-mail service can operate on an all-the-year-round basis with adequate factors of reliability. Here the answers which actual experience can provide are particularly illuminating. On the immediate post-war air-mail which was flown for six months between Hawkinge and Cologne, the factor of reliability was 60 per cent. That was in 1919, fourteen years ago. In 1924, nine years ago, when Imperial Airways absorbed the then-existing British air companies, the reliability figure stood at 75 per cent. To-day, in 1933, our big British mail-planes are flying with an annual reliability of 96 per cent. for European routes, and of as much as 98 per cent. for Empire air lines—which is a very conclusive

answer to the question: "Can air-mails operate dependably?" Obviously they can, on the showing of their proved records, and that the business world recognizes their reliability, and places full confidence in them, is indicated by the rapid growth of loads, to-day, on all the main air-mail routes.

A third main question which civil aviation has been called upon to answer is this: "Can air travel be made is really comfortable for passengers?" Here the answer provided by the giant British air-liners, as operating on our main flying routes to-day. In each of these "ships of the air" the saloons are as large, and as sumptuously appointed, as those of a railway Pullman, while the placing of the engines away from the hull, and the employment of sound-deadening materials, prove so efficient that the noise passengers hear in the saloons, even when in flight at more than 100 miles an hour, is no louder than in an express train. The complete catering provided in the modern air-liner, and the smoothness of its movement through the air, make the airway an ideal medium for rapid travel. In fact, as General Smuts declared after alighting from his recent 8,000 miles air journey from Africa to England—"It is a continual joy-ride; a great experience which one wants to repeat."

A fourth and fundamental question to which air transport is called upon to give an answer can be put in the following words: "When will our air-mail services demonstrate their ability to operate on a normal, profit-earning scale, without Government help in the form of subsidies?" This is a vital question we have touched upon before, but of course it is so important that it is presenting itself constantly. Briefly, the answer can be expressed in the statement that what our airways need to secure—and what they are already in the process

of securing—are bigger all-the-year-round loads in order that their overhead charges may be distributed over a larger volume of traffic; while they also require still more advanced types of aircraft which, while maintaining high speeds, will carry more paying load per horse-power. The problem of yesterday and of to-day in air-mail transport, is to fly as fast as you can with a reasonably remunerative load, combining always with this speed, whatever it may be, the essentials of safety and reliability, and of a high standard of comfort. In such essential aspects British air-mail transport has a record of which it may be proud. Although since 1924 our Imperial Airways company has been engaged on development work which has involved heavy capital outlay, its figure for earned income in relation to subsidy has shown consistent improvement, and now stands at just on 50 per cent. The shareholders of the company receive dividends; its rates are among the lowest in the world; and its air-liners carry bigger average loads, and cover a bigger average mileage per machine, than those of any other country. It may be said, in fact, that British air-mail transport is approaching more nearly than the air transport of any other nation to the goal of independent, State-free operation. One of its troubles, however, is that critics often want it to go ahead more quickly than is practicable. Progress cannot be created by the wave of a wand. It can only come by steady development in which technical and commercial progress go hand-in-hand.

It is of course one of the fundamental needs of the aerial mail, in its endeavours to become self-supporting, that its aircraft should be improved, commercially, from the view-point of carrying bigger loads for any given expenditure of power. As we have already shown, the 1 lb. per horse-power of pioneer 'planes has been

improved to the 3½ lbs. per horse-power pay-load of the air-liner of to-day, and now it is hoped that further technical advances, already foreseen, will increase this figure to 5 lbs. per horse-power and more. In this respect many avenues of research lie before civil aviation. Development, in fact, is still in its infancy. One should be able to buy speed at lower expenditures of power by a further cleaning-up of design. Still greater efficiency is looked for with engines, propellers, wing sections, and in reductions of structure weight, while flying at night on a commercial basis—so essential to the speeding-up of the aerial mail—involves an endeavour to combine in one and the same aircraft such ranges of speed, and other qualities, as will enable that machine to be used, economically and safely, both by day and night on long routes.

One of the most intriguing questions, in air transport development, is whether our big mail-planes of tomorrow —the flying machines of the future—will resemble in their appearance the aircraft of to-day, or whether they will develop along lines which will transform them, gradually, from anything we know at the present time; and researches which are now in progress, in many fields of aeronautical science, lend peculiar interest to this problem of the evolution of the aeroplane, and more especially of the machine intended for the high-speed transport of mails. The experiments which were necessary, before we could build purely high-speed machines capable of flying at more than 400 miles an hour, have taught vital lessons which are still being analysed in every detail, while the fourteen years of practical experience of our air-mail engineers, operating aircraft to schedule under all sorts of conditions, are providing data which is influencing the whole trend of commercial air design. In fact scientists, designers,

and engineers are all striving now towards the same goal—the improvement and simplification of the flying machine so that, as a high-speed carrier of mails and other loads, it can render a maximum of service to the world at large.

In thirty years, as we have shown, since the first engine-driven flights were accomplished, the aeroplane has developed from a rudimentary 12 h.p. apparatus, carrying one man at about 35 miles an hour, to a 2,200 h.p. machine carrying as many as forty-two people at more than 100 miles an hour; while during the past fourteen years we have seen commercial air-mail transport grow from a small two-passenger craft, flying for just 250 miles between London and Paris, to the Imperial Airways system of great multi-engined craft, aeroplanes and flying-boats, operating with their mails, passengers, and merchandise over 14,000 miles of routes. That first aeroplane of 1903 was a frail affair of wood and wire, its operator lying prone across its lower wing, working his controls by hand-levers; but to-day our big mail-planes have become 13 or 14 ton craft of metal, built on engineering lines, and with their pilots seated in glass-windowed control cabins, every instrument that science can devise being available to aid them in their handling of their great machines.

Wonderfully, indeed, has the flying machine developed, and yet that development has been logical, and mainly along sound engineering lines. It was with a biplane machine, having one lifting surface above another, that the world's first aeroplane flight was made, and that same biplane construction is generally in use to-day; while the monoplane type in which Blériot made his historic Channel flight in 1909 has continued to hold its own in air design, and is increasingly in favour to-day. As regards the control of aeroplanes while in flight,

the mechanisms employed in ascending or descending, and for lateral balance or for steering from side to side, are substantially what they were in early-type craft, although of course their actual functioning has been rendered far more efficient. Like the motor-car, in fact, the flying machine has been subjected over a period of years to a general process of " cleaning-up ", or technical development, without much alteration of its essential characteristics. Naturally we have had many fresh lines of research ; that was to be expected—and desired. There are, just as an example, the revolving-wing types of machine, which can now stand almost still in the air, besides being able to glide down steeply and alight in any quite restricted area; while another remarkable phase is represented by such a tail-less type of craft as the " pterodactyl ". There are, as a matter of fact, certain main trends which are specially significant at the present time. In the first place there are the experiments, which are constantly in progress, and which aim to develop still further the efficiency of wing surfaces, control systems, engines, and propellers. Then there are the researches which are intended to enable aircraft to ascend from, and alight in, more restricted areas than has been possible hitherto, thus rendering them still more practical from the view-point of ordinary commercial use ; while tests are also in progress with a view to giving flying machines the power, when required, of hovering almost motionless in mid-air. Yet another field of research aims to simplify aircraft construction on modern engineering lines and, by structural and other improvements, to render aeroplanes and flying-boats still more efficient from a mail-carrying and generally commercial view-point.

One of the facts which dominates aircraft progress, as it does that of the motor-car, is that for everyday use

you must have a mechanism which is simple, sturdy, and not too costly in construction. Machines which are scientific toys, no matter how ingenious they may be, are of no use to the engineers of the modern air-mail, who are called upon to operate services to schedule in all kinds of weather, and who insist upon mechanism which is as simple as possible to maintain and overhaul. Intricate machinery, though it may do what it is intended to do, may still prove too complicated for normal use. The desire nowadays, with civil flying machines, is to make them straightforward engineering jobs. And, at the same time, as speed is the essence of air transport, and particularly of air-mail transport, the aim while ensuring reliability is always to make machines fly more rapidly; and not to do this merely by costly increases in power but by streamlining aircraft scientifically so that they offer the smallest resistance to their own swift movement. The general policy, nowadays, in developing aircraft for regular air-mail routes, is to follow a carefully-planned technical programme based on actual operating experience, the aim always, of course, being to carry the biggest loads at the highest speeds and at the lowest cost per ton-mile which, at any given time, are compatible with reliable working on commercial lines. Thus aero-engines are being developed which furnish still higher power for any specified weight, while the science of metals is being studied constantly in order to find ways of further lightening aircraft structures without in any way impairing their existing factors of strength; and at the same time technicians, with wind-tunnel and other experiments, continue to throw fresh light on the problems of ensuring that mail-planes and other craft shall fly swiftly with a minimum of the "drag" caused by air-friction or turbulence over wings or hull.

When they look ahead nowadays some experts foresee that the aeroplane of the future may, in comparison with the flying machine as we know it now, appear a very strange craft as it moves swiftly through the air with its mails, passengers, and freight. It is considered possible that it may be just one huge widespread wing and very little else. Its rudders may be mounted directly on this wing. Vertical movement also, and lateral control, may be effected by surfaces which form part of the wing ; while inside this great, curved, hollow surface may be ample space for engines, fuel-tanks, and passenger saloons, together with mail and freight compartments and the control-cabins for pilots and engineers. With the exception, indeed, of external propellers, control-surfaces, and an alighting-gear which will be drawn up within the hull when not in use, the aircraft of the future may be just one huge, hollow surface, curved to support itself in the air when moving at high speed, and carrying its motive-power and load actually within its capacious hull. Already, at the time of writing, not only in design but also in construction, progress is moving along these very lines, and the " flying wing " type of craft is showing that it is something very much more than a dream. Granted further development in this direction, along strictly commercial lines, there are experts who argue that we may be approaching something like finality in high-speed heavier-than-air machines of a long-range mail-carrying type, with single lightweight structures serving both as wing and hull, and offering a minimum of resistance to their own forward movement.

And meanwhile, so far as the flying mail is concerned, there is no spectacular short-cut to success. Flying, one must always remember, is governed by the laws of economics, and must go forward stage by stage,

establishing itself on a basis from which nothing can shake it. Our great trunk air-mail routes must be extended, link by link, as is the case, now, with the all-important line through from England to Australia. And from Australia other sections must be established which will, in due course, bridge the wide Pacific and link up with the great trans-continental air-mail which already spans America from San Francisco to New York. Eastward from the American continent will fly the Atlantic mail-planes to Europe, where connections will be established with the network of continental air-lines and also with the trunk England-Australia route which, with the other great main airways, will enable us to throw an air-mail girdle completely round the world.

A priceless boon to commerce, this globe-encircling flying-mail should prove; while our network of world air-lines, carrying their passengers as well as mails, should be something even more than that. Civil aviation, and the long-range flying mail, represent one of—if not the—most important of all our modern developments. Already, though our air-mails are still comparatively in their infancy as a world force, we see how they can save us not merely hours, but days and even weeks, when any long journeys are in question; and in the days in which we now live the saying that time is money is truer than it ever was before. In addition to sending our letters by air, none of us need hesitate for a moment, nowadays, about flying ourselves in the big modern mail-planes. Our air-lines not only give us speed, as we have shown already in these pages, but they also give us safety, reliability, and a degree of comfort which equals, in some respects surpasses, that of surface travel. We have been told for a long time past that the air age was coming. Well, what we should like our readers to appreciate is the fact that this

age of the air has now arrived. We are actually in the beginning of it here and now, and already we can see how, as it develops, it will mean for us a new world—a world of wider, swifter, more universal travel, in which we shall journey thousands of miles just as easily and quickly as, hitherto, we have travelled hundreds, and in which no part of the earth's surface, however remote, will be more than a few days' journey from London by the flying mail.

Those of us who have seen the air-mail develop from its infancy are convinced that the world will be a very much better place to live in when we are reaping the full advantage of the age of the air. Rapid intercommunication is of such supreme importance. And it is the personal touch which means so much. In addition to being able to waft our letters from one to another by the speed of an all-embracing flying mail, we in this great world need to know each other better. We need to be as at home in foreign capitals as we are in our own, and in this respect the high-speed air-mail—carrying its passengers as well as its loads of letters high above all earthly barriers—is the greatest of all removers of artificial restrictions. After one has been flying thousands of miles in all directions, as have the pilots of our big mail-planes, one forgets the existence of frontiers. One simply crosses the Channel and steers on above Europe, and great foreign cities are no longer strange and remote places. They are just so many ports of call in the unbroken ocean of the air.

There is, truly, an immense psychological importance about the widespread development of the flying mail. And nobody realizes this better than do our air-mail pilots, who are now as at home at far-distant air-stations as they are at our fine air-port at Croydon. Narrow-minded views cannot survive the tolerant opinions

one soon begins to form when one " drops in " constantly, by air-mail, at towns and cities in different lands. One's ideas cease to be national; they become international. One begins to think of one's fellow-men not as citizens of any particular State, but as citizens of the world. " Transportation is civilization ", as Kipling has told us, and in globe-girdling air-mail transport—not only in the time it will save us in correspondence, but in the days and weeks it will save us when we ourselves make any long journey—we now have one of the great keys to the world progress of the future.

THE END

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