

Imperial Air Routes

Author(s): Frederick H. Sykes

Source: *The Geographical Journal*, Vol. 55, No. 4 (Apr., 1920), pp. 241-262

Published by: [The Royal Geographical Society \(with the Institute of British Geographers\)](#)

Stable URL: <http://www.jstor.org/stable/1781731>

Accessed: 20-03-2015 12:54 UTC

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at
<http://www.jstor.org/page/info/about/policies/terms.jsp>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.



The Royal Geographical Society (with the Institute of British Geographers) is collaborating with JSTOR to digitize, preserve and extend access to *The Geographical Journal*.

<http://www.jstor.org>

The Geographical Journal

Vol. LV No. 4

April 1920

IMPERIAL AIR ROUTES

Major-General Sir Frederick H. Sykes, G.B.E., K.C.B.,
C.M.G., Controller-General of Civil Aviation

Read at the Meeting of the Society, 2 February 1920.

I AM very glad to have the opportunity of addressing the Royal Geographical Society to-night on some of the attributes of Imperial air routes. The interest of your Fellows on a purely geographical basis will, I know, be of much assistance both to individual airmen and to those, like myself, responsible for some parts of Imperial air organization as a whole. But there is a further reason why I welcome this opportunity. Your Society has always been to the fore in Imperial movements, and the subject on which I am about to address you to-night will therefore, I hope, be of special interest to you, although I can, in the time at my disposal, deal only with a few of its many problems and anxieties. Your confidence and support will help us to overcome these.

Before passing to the main subject, I think it important to refer for a moment to the remarkable evolution which aviation has undergone in recent years. It is sometimes difficult not to forget that when the war broke out the science was but a dozen years old. Although on 14 October 1897 M. Ader's "Avion," carrying a pilot, lifted itself off the ground, it was only on 17 December 1903 that the Wright brothers made their first practical free flight through the air in a power-driven machine, and thereby heralded a new era in the history of the world. It was only on 25 July 1909 that Blériot made the first crossing of the Channel by aeroplane.

The controlling factors in aviation are still imperfectly understood, but there is something very-striking in the strange sequence of events whereby the problem of flight was solved just in time to assist in the conduct of the war and in the achievement of victory, gaining in the process incredible impetus to its development.

The science of aeronautics is now endeavouring to spread its young wings in the service of peace and for the expansion of industry, not only in the Imperial Commonwealth, but throughout the world. For the

S

far-flung battle-line it hopes to substitute a world-wide commercial network. Even before the Armistice steps had been taken in this direction. In June 1918 I prepared and read a paper to the Imperial War Cabinet, in which the policy of uniting the various parts of the Empire by air was discussed.

The first flight to Egypt and India was made under my directions by Brigadier-General A. E. Borton and Major-General W. G. H. Salmond in November 1918, in order to demonstrate the practicability of reinforcing the Air Service in India by air. Then, directly the Armistice was signed, I issued instructions for the pioneer work of opening up the India to Australia and the Cairo-to-Cape routes, to be undertaken by General Salmond. To carry this into effect, General Borton was sent to survey the difficult stages east of Calcutta to Australia *viâ* Burma, the Malay Peninsula, and the Dutch East Indies, and to prepare a scheme for the establishment of landing-grounds. At the same time three survey parties started on similar work between Egypt and the Cape.

Meanwhile, during the winter of 1918 and the spring of 1919, the Empire committee of the Peace Conference assisted in the discussion and solution of many problems. Not only were Imperial air matters considered in Paris, but, as you know, much thought was given to international relations which resulted in the International Air Convention—first conceived in Great Britain, and much assisted by a valuable report drawn up by the Civil Aerial Transport committee. Agreement was also reached on the establishment of an International Committee for Air Navigation.

The Convention, which has now been signed by all the Allies except the United States, Japan, and Canada, allows aircraft of one contracting state freedom of innocent passage over the territory of another; forbids the flight of an aircraft of a non-contracting state over the territory of a contracting state; and lays down detailed regulations based upon those already adopted in this country. Certain neutrals such as Holland, Switzerland, and the Scandinavian countries, have signed or are considering agreements on the same lines.

In some of the Dominions Air Boards have been constituted, and I hope that before long the rest will follow suit. At home, during this period of growing co-ordination, information has been collected, experience gained, and a general knowledge of the possibilities of civil flying has been built up. The Meteorological Office has been linked with the Department of Civil Aviation, the Imperial Communications Committee of the Cabinet is kept in touch with wireless requirements, and general co-operation between the Air Ministry and other Government Departments, such as the Colonial Office, India Office, Post Office, Foreign Office, and the High Commissioners for the various dominions, has steadily improved. An Advisory Committee, under the chairmanship of Lord Weir, has been appointed for the consideration of various problems.

So much for the official work of organization. On the practical side, an air service was instituted between Folkestone and Cologne immediately after the Armistice, in addition to a service between London and Paris for the purpose of accelerating communication with the Peace Conference. Certain firms, such as Messrs. A. V. Roe, carried out useful instructional work by means of short passenger flights; and in the London-Paris and London-Brussels air services, conducted by the Aircraft Transport and Travel Company and by Messrs. Handley Page, I hope we see the first of numerous lines which will radiate from London to the commercial centres of Europe.

During the five years of war, progress in the art of flying, research, production, training, and organization have naturally been governed by naval and military requirements. As a result of this our air forces have become and will remain a principal factor in Imperial defence, and should we be compelled again to wage war—and we cannot disregard such a possibility—air power will give the best and most rapid return for the expenditure of national resources of man-power, material, and money. Moreover, as the rapid assumption of the offensive is generally the leading principle in warfare, so will the strategic air offensive be the dominant factor in air power.

If an Empire air power, both Service and Civil, is developed, organized, and co-ordinated, our supremacy in the air will in the future be as valuable in assisting to maintain the peace of the world as our supremacy on the sea. If I may, I will quote a few words here from a lecture I gave about two years before the war: "The navies of the world will have to relinquish their present proud position; their *rôle* is that of a floating defence. The Air Service built up on joint Army, Navy, and Civilian foundations is in the foremost line. Fortresses, arsenals, dockyards, Government offices, factories of war material, are protected from the air. . . ."

How, then, as a world-wide Empire are we affected?

The situation of Great Britain from the standpoint of civil aviation differs geographically from that of most other nations. The sea is but one hour's flight from the heart of England. Fog, the notorious variability of our weather, the fact that England lies on the periphery of the system of which Egypt—as I will show later—is the hub, all militate against successful aviation. Yet, from the broader aspect, the Empire is geographically in an unequalled position for establishing air depôts, refuelling bases, and meteorological and wireless stations in every part of the world.

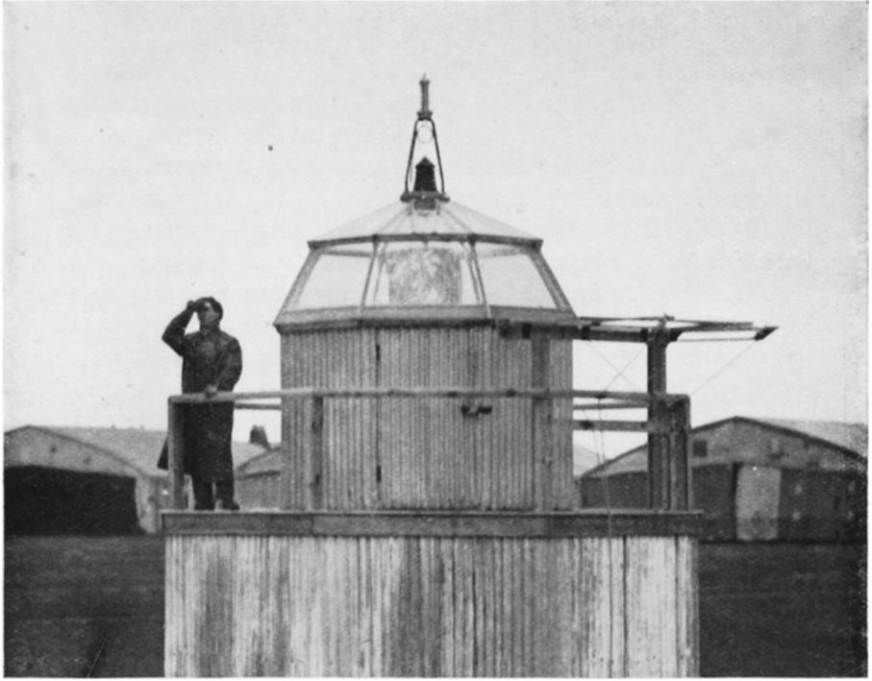
The most divergent geographical conditions obtain between the different parts of the Empire—Canada and India, Newfoundland and Egypt, New Zealand and South Africa. The same is true of the component parts, some of which, such as Australia, embrace a continent and a full quota of continental geographical and meteorological variations. As

the problems involved in each section of all the great routes also vary so widely, it devolves upon those associated with the air-development of the Empire to take a broad view, and, while realizing that underlying principles are similar, to recognize that the same policy for the whole is impracticable.

The most cursory review, however, will show that in all the Dominions there exist great opportunities for the development of civil flying—the distances between commercial centres; the fact that aerodromes can be made inside, instead of outside, new cities; the broad inland waterways; the stable climatic conditions; the barriers of nature, wildernesses, deserts, and mountain chains well-nigh impassable to existing means of transport. All these factors and the wonderful achievement of the Dominions in the war, demonstrated by the fact that many thousands of their citizens joined the flying services, point to the same conclusion.

Turning to a few of the points which present themselves in connection with the general development of Imperial routes, the first which occurs to one is that Egypt for some time to come must be the “hub” or, as I have long called it, the Clapham Junction of the India, Australia, and Cape routes, and the heart of the whole system of their expansion. You may recall that the Government has recently decided primarily to help in developing the Egypt-to-India route, and I think you will agree that this decision is wise. The route to Egypt from England is still complicated. The Cairo-to-Cape route is at present less likely to pay commercially. The great span from England to Newfoundland and Canada will necessarily be the last—or next to the last if one includes the Pacific—to be developed, owing to the great physical and meteorological difficulties to be overcome.

The route between Egypt and India, on the other hand, holds out many advantages. The weather conditions are on the whole stable. The time of transit by sea from Port Said to Bombay in normal conditions is nine days; the journey by air, flying by daylight only, takes four days from Kantara to Karachi. Sea transit, it is agreed, could be much accelerated, but I am informed that the cost of this would be very great. Moreover, steamship companies would hardly attempt to compete when it was known that by air transit, with the establishment of a relay system and by flying night and day, the mail from Port Said could be delivered at Karachi in under thirty-six hours. There would be an even more remarkable saving of time in the journey between Cairo and Baghdad, which by air takes only twelve hours, but by the existing sea route *via* Bombay and Karachi as long as three to four weeks. Geographically, too, the conditions are on the whole favourable, and—an important factor—there are valuable potentialities for branch lateral systems into Persia, Mesopotamia, and Turkey. Finally, this route has been chosen for exploitation because it was thought that in order to obtain experience



THE AIR LIGHTHOUSE, HOUNSLOW



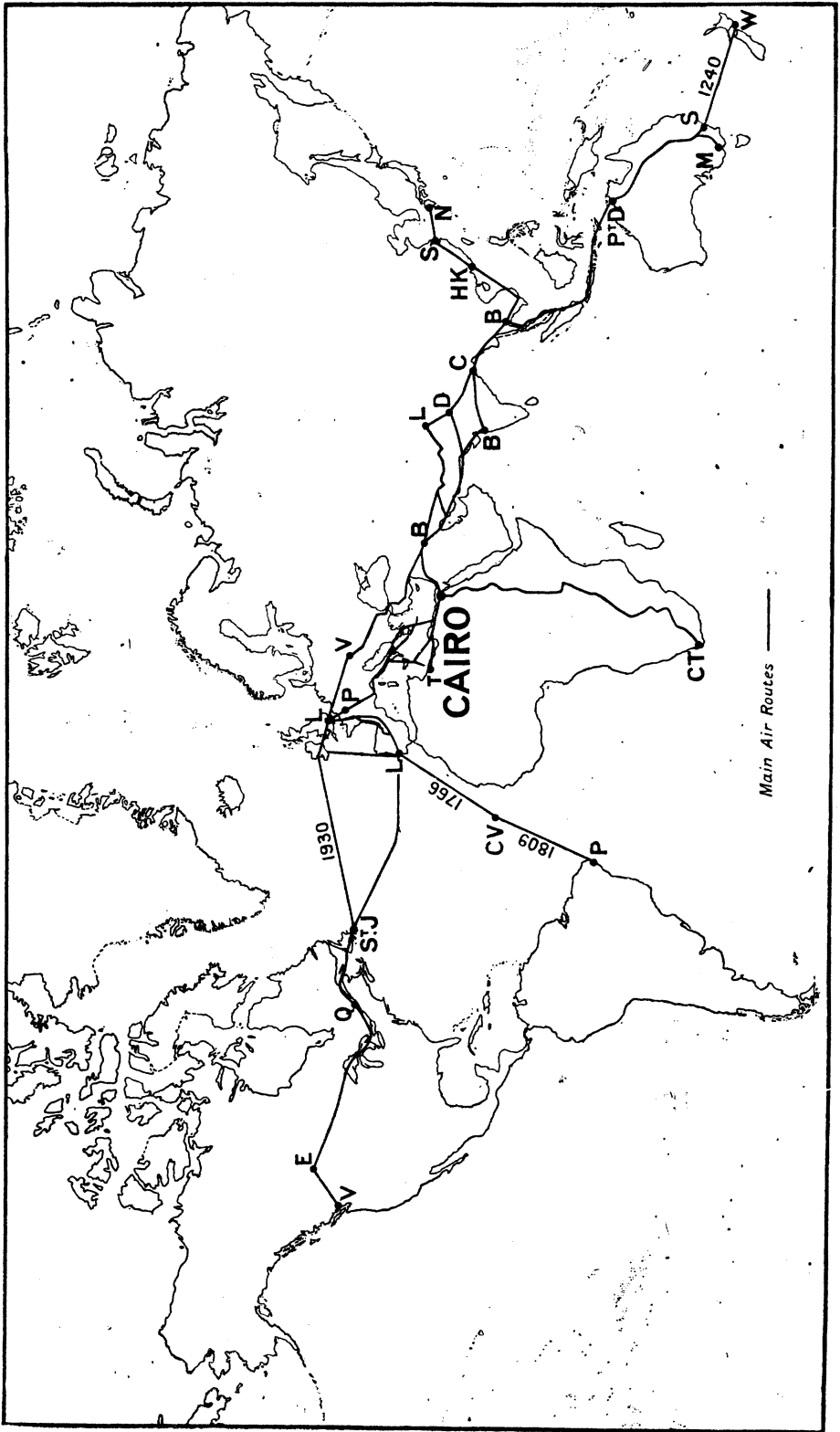
CLEARING AN AFRICAN AERODROME



AN AFRICAN AERODROME FINISHED AND MARKED



WEEDING THE AERODROME



Air routes of the World : Overseas distances in statute miles

and data in the quickest possible time for the furtherance of Imperial aviation generally, the simplest part in the great and complicated machine should be made first.

Though work must be continued on the India-to-Australia route, the next, in order of attraction and offering the greatest results, is that from Egypt to the Cape. South Africa offers potentialities which it is impossible to assess. The route is 'all red,' and so avoids any possible international complications. There is a great gap of some 1900 miles between the railway terminus at Senaar in the Sudan and N'dola, the most northerly station in British territory on the railway from the Cape; and Central Africa, that unknown land of which we read in our youth, the scene of the adventures of our great explorers, Livingstone, Burton, Stanley and the rest, awaits the coming of the pioneers of the air.

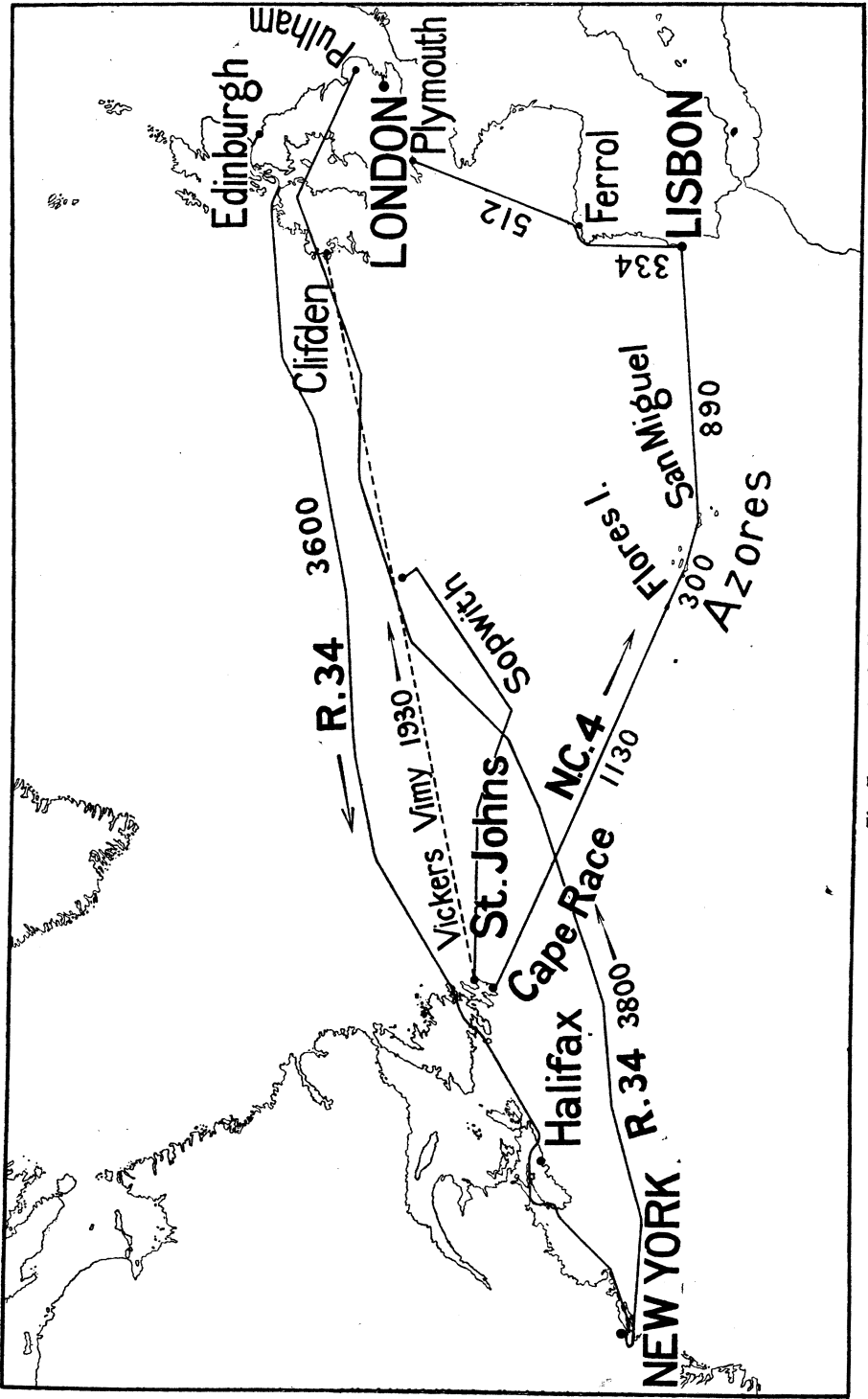
I hope and feel sure that, as a British firm and British enterprise have secured the blue ribands of the Atlantic and Australian flights, the third great flight from Cairo to Cape Town will also be achieved by a citizen of the Empire. I wish that Joseph Chamberlain and Cecil Rhodes could have seen the air-route map of Africa.

Concurrently, the great chain between India and Australia has to be developed. It is possible that this route might also be made 'all red' by the use of Christmas Island, but, apart from the difficulties of making an aerodrome there, we are singularly fortunate in having the cordial co-operation of both the Dutch Government in Holland and of the Governor-General of the Dutch East Indies. I visited Holland last year and discussed the mutual assistance which Britain and Holland could render, and my suggestions in regard to the Dutch East Indies were later more than loyally carried out.

The route which will eventually be used between the Home Country and our Egyptian aerial hub requires special treatment. The practicability of Malta as an intermediate landing-ground is being considered, so again ensuring an all-red route as soon as a range of 1300 miles has become a normal effective flying stage for aeroplanes. In the event of this stage being better adapted to the employment of airships, a base at Malta will also be a necessity. The great saving in time will be effected beyond Egypt, whether it be to India or to the Cape; but we want also to reduce the time of transit between England and Port Said, at present five days.

Last, but by no means least, of the Imperial routes which requires development, is one which I have already mentioned—from England to Canada—a step which will bring us into more immediate touch with the other great half of the English-speaking world.

Within a few days of each crossing of the Atlantic—by Commander Read of the United States Navy in a flying boat, *via* the Azores; by direct flight by the late Sir John Alcock in the British Vickers aeroplane in sixteen hours; and, out and back, by Major Scott in the Airship R 34—



The Trans-Atlantic flights

I was asked why it was that regular services could not at once be set up between New York and London.

“Neququam deus abscedit
Prudens Oceano dissociabili
Terras. . .”

With air communication established between England and Canada, the last link of the world chain may be forged. Airships or seaplanes may have developed to the point where the passage of the Pacific between Canada and Australia will be a practical proposition.

Another route which cannot be neglected is that between England and the West Indies with the Azores as a stepping-stone. From some central point in the West Indies a connecting service of flying boats could be usefully employed for the distribution of mails.

What are our requirements in traversing the wide fields of exploration and expansion which lie open to us? It is imperative that the first line of the fighting force of the future should be always on a war footing. We have all seen the great value of the aeroplane in war; how from being the opening eyes of the army, mentioned in those early despatches of Lord French, it has developed into one of the most powerful engines of destruction. At the moment of the Armistice we were only on the verge of seeing the capabilities and effects of long-range bombing. In the famous words of John Bright, “The Angel of Death has been abroad throughout the land; you may almost hear the beating of its wings.” Observation, photography, control of artillery fire, bombing, direct attacks on infantry may be numbered among its multifarious duties. The next war will in all probability open with a fight for the mastery of the air which will be secured by attack and defence.

Civil aviation will be the best method of ensuring a reserve of capable airmen and good material to draw upon.

The analogy of the Navy and the Mercantile Marine is close in more ways than one. We can draw upon the commercial service in time of war, but as it is impossible to convert a merchant vessel into a first-class battle cruiser, so it will be impossible to convert commercial aeroplanes into first-class fighting machines, though it is true that civil aircraft can be more easily used for direct war action, such as bombing, than a converted ship of the Mercantile Marine. For purposes of war aircraft designers and constructors concentrated their efforts upon the evolution and production of machines of the highest possible speed combined with the maximum climbing and manœuvring powers. For commercial purposes, too, speed is essential, but it must to a greater degree be combined with reliability, flying radius, weight-carrying capacity, and reduction in costs. In peace a change of relative balance will naturally ensue between civil aviation and military aviation. Military aviation

must be circumscribed on the grounds of finance, whilst civil aviation must never cease to expand and gradually to produce revenue. Military design must be concentrated on speed, climbing, manœuvring and fire power. Commercial design must be fixed on one object only—the development of the machine as a reliable commercial vehicle. Each will co-operate with the other, but each has its own orbit; the one with its eyes on direct fighting Imperial defence, the other as an instrument for the development of Imperial trade, which can be used if necessary as a great aerial reserve. Each requires to be allowed to breathe freely in the air which is its province.

Britain must become the carrier of the world, not only on the sea, but in the air. The names of Alcock and Ross Smith are in themselves sufficient proof that “*Nil mortalibus ardui est.*” These men accomplished great pioneer flights; but the organization of routes for continuous commercial utility involves a large amount of steady inconspicuous preliminary work.

The time at my disposal allows me to touch on only a few of the problems governing commercial aviation. There is no more important factor in its success than efficient ground and navigation organization embracing aerodrome, repair and depôt arrangements, air surveys, cartography, route directions, aerial marks and beacons, wireless, visual signals, land lines, codes and cyphers. Nine-tenths of the problem may be said to consist in ground work.

Another important step, to which I have already referred, has been taken, by uniting the Meteorological Office with the Department of Civil Aviation. As the discovery of the trade winds was largely responsible for the great rise to power of Spain and Portugal, so to a still greater extent will meteorological conditions influence the course of aviation. The Meteorological Office undertakes the entire weather investigation and forecasting service of Great Britain. As befits its importance it has far-reaching aims, and, in conjunction with the Dominion and Foreign Meteorological services, is preparing plans for linking up the world by an ubiquitous system of weather research and reporting stations, the whole equipped with wireless intercommunications. We have charted the Earth, we have charted the Heavens. We must chart the Air.

The co-operation of the Post Office is equally important. The air mails are the real foundation of the whole system upon which Imperial routes must be based. To give an example, before the war mails from the United Kingdom took on an average twenty-nine days to reach Adelaide. When aircraft are used in this service, the time will be reduced to about sixteen days, and to considerably less as soon as night-flying can be organized. The chief difficulty to be overcome is that of cost. At present 2*s.* 6*d.* is charged as an experiment for carrying a letter from London to Paris, but when experience has been gained this amount must be reduced, and it is quite possible that with increased confidence, experi-

ence, and bulk of matter, a letter may be sent from London to Paris by air at a very much lower charge.

The following table gives the estimated gross weight of weekly letter-mail to various parts of the Empire, a portion of which may in the future be carried over the Imperial Air Routes :

<i>Destination</i> :	Egypt	...	...	...	...	2000 lbs.
	Cape	...	...	...	...	4000 „
	India	...	...	...	...	8500 „
	Australia	...	...	...	...	7000 „
	New Zealand	...	...	...	...	2500 „

Speed, reliability, and cheapness of cost are the blood and nerves of aviation. I estimate that in order to compete successfully in commerce, aircraft must aim at being in a position to complete a journey in one-third of the time taken by other methods of transport. Increased speed may be obtained in two ways : first, by the improvement of ground organization, so enabling night-flying, and the employment of an effective relay system ; and, second, by the improvement and development of the engine. Meteorological conditions affecting night flying are distinctly favourable ; the sky during most months of the year being three to four times clearer by night than by day, and the winds on the landing-grounds being very considerably weaker, though above 150 feet the reverse is true. To ensure the safety of night-flying a great deal of work still remains to be done, such as the marking and lighting of aerodromes, the perfection of signals, and establishment of lighthouses. It is certain that on long routes a relay system will be adopted, and this requires careful consideration of the types of aircraft best adapted to the different sections of the route according both to their geographical features and the distances to be flown. There is not time to discuss the merits of various types of aircraft best suited for different purposes ; suffice it to say, that over certain sections airships, over others sea-planes or flying-boats, may be usefully substituted for aeroplanes. Light craft are best suited for mails and passengers, heavy craft for other kinds of freight. Pilots, too, will need a special knowledge of that section of the route over which they will have to fly. The transshipment involved in a relay system will entail a certain delay and extra labour, but under existing conditions this is also the case where more than one form of land or sea-transport has to be employed.

The password of commercial aviation must be "Safety first." It does not require an imaginative mind to picture the consequences of a forced landing among the forests of Central Africa, or on the arid shores of the Indian Ocean. Aviation has demanded and still demands its toll of human life. But I think the following figures will give a good idea of the very remarkable progress which has been made in ensuring reliability. From May 1 to December 31 of last year the total number of hours flown by the machines owned by the principal firms engaged in civil aviation,

exclusive of the competition flights from England to Australia, amounted to 8368; the number of flights to 35,330; the mileage to 593,000; and the passengers carried to 64,416. During this period 18 accidents occurred, resulting in the death of 4 pilots and 1 passenger, and injury to 6 pilots and 10 passengers. This represents one accident for 32,900 miles flown. In other words, the rate of deaths per thousand hours flown was 0.48 pilot and 0.06 passenger, or 0.016 passenger per thousand passengers carried. Compare these figures with the casualties incurred on the first railways. In the second half of 1840, the third year of travel by rail, 153 passengers were injured; in 1841 ninety-five, or one passenger in 6900 journeys; and there is reason to suppose, though I have not got the figures, that the casualties for the first two years were still heavier.

I may mention that, while 67,143 lbs. of goods were carried by air during the same months, the value of the imports and exports by air for the United Kingdom during the period August 26 (that is, the day upon which international flying was first allowed) to 31 December 1919, was about £60,000 of imports, and £31,200 of exports.

I should like now to add a few words on the future air policy of the component parts of the Empire. The principles of Service and Civil air requirements apply equally to the Dominions as to the Mother Country. The enemy of the future may arise nearer to a Dominion than to England herself; each, therefore, while keeping close touch with Home in matters of common policy, should, in my opinion, have a small Service and a large civil air fleet to meet its own strategic and commercial needs, and the Empire air-organization should be able quickly to concentrate for its assistance. In Canada the Air Board which, as in other Dominions, has been recently constituted, fully appreciates the close relationship and interaction between Service and Civil Aviation. It realizes the desirability for civil pilots to undergo a short training in an Air Militia, and the utility of aircraft, both heavier and lighter than air, for forest patrol and survey work, more especially in the northern areas of all the provinces from Quebec westwards.

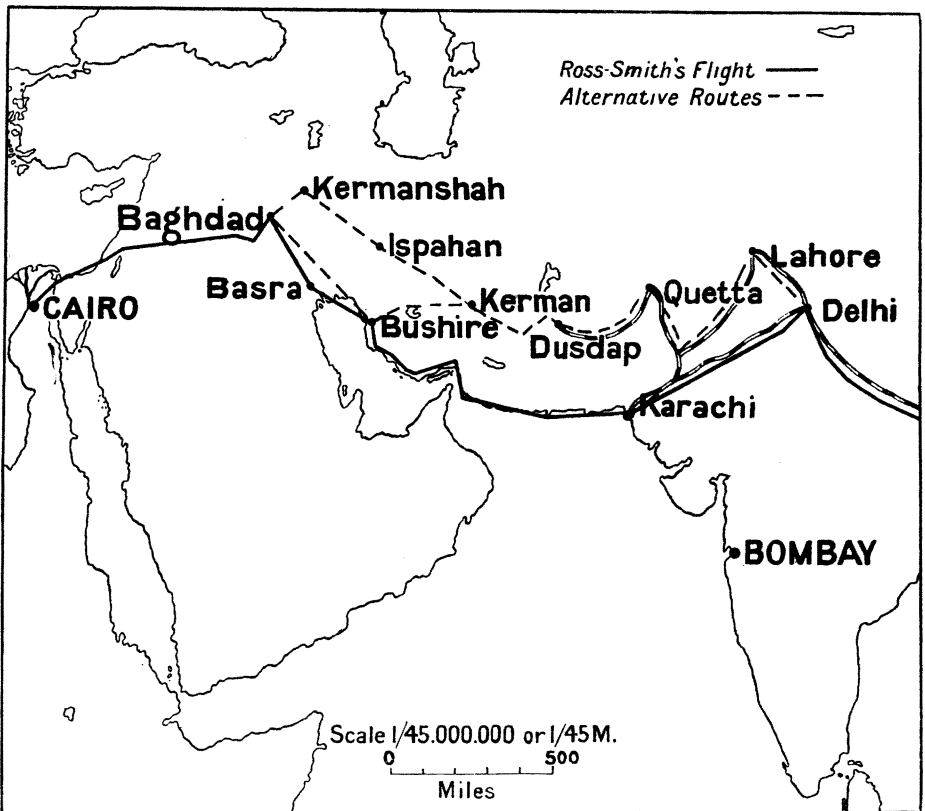
We are dealing with an element of which we know only the rudiments. Experience gained in each part of the Empire should be exchanged for the good of all, and so a mighty air commerce be gradually built up which will foster the industry of the Imperial Commonwealth; act in unity indirectly both as a guardian of the peace and as a great reserve to the service of scientific skill; and finally provide trained personnel and material in the last resort of war.

“Progress” represents difficulties overcome. As the ideal is the higher, so is Progress the sharper. Among its difficulties are the continuous strain on the pilot, the fallibility of all things human, and, as yet, of aero engines; and lack of organization with regard to ground facilities between the various important centres of the world.

At the present time, too, when there are so many fruitful fields of investment, it requires large faith on the part of the public to believe that the chrysalis will one day burst into the full butterfly of aviation. But in a few years, when the organization is complete, when public confidence has been secured, the air traffic foretold by Jules Verne and Rudyard Kipling will no longer exist only in the realm of fancy, but in the practical work of everyday life.

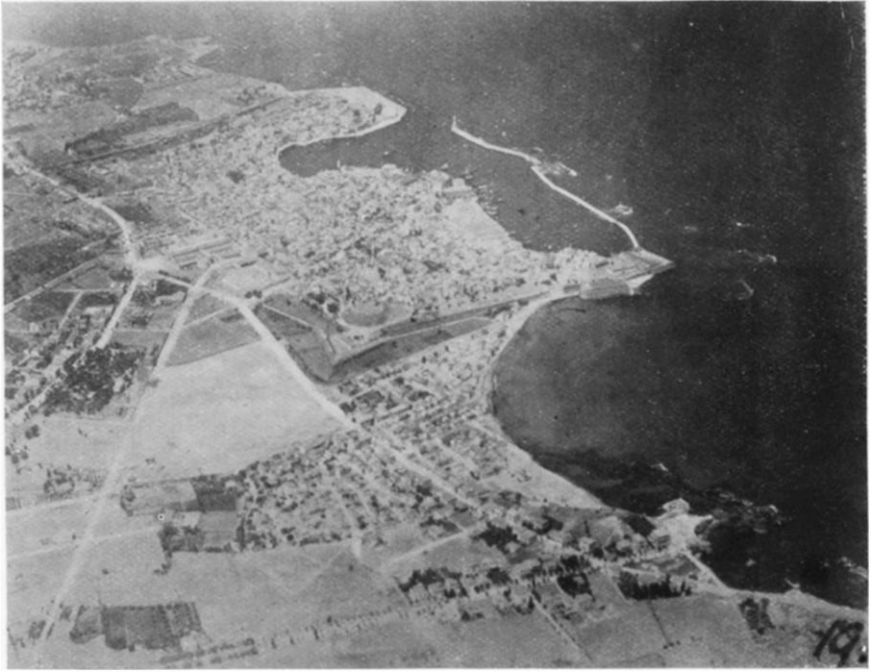
Description of the Routes: Egypt to India.

Starting from Kantara, the aerial route to India proceeds across the Sinai desert through Palestine to Damascus, a considerable amount of



Air route: Cairo to Karachi

difficult and hilly country being covered in the flight. From Damascus an easterly course is steered across the Syrian desert to Baghdad, whence, under conditions of little geographical difficulty, a south-easterly course, more or less following the River Tigris, brings us to Basra. From Basra the northern shore of the Persian Gulf is followed *via* Bushire to Bundar Abbas. It is necessary, in this section, to skirt the shore, as the moun-



ENGLAND TO EGYPT: CANEA FROM THE EAST



ENGLAND TO EGYPT: THE TOWN OF TRIPOLI



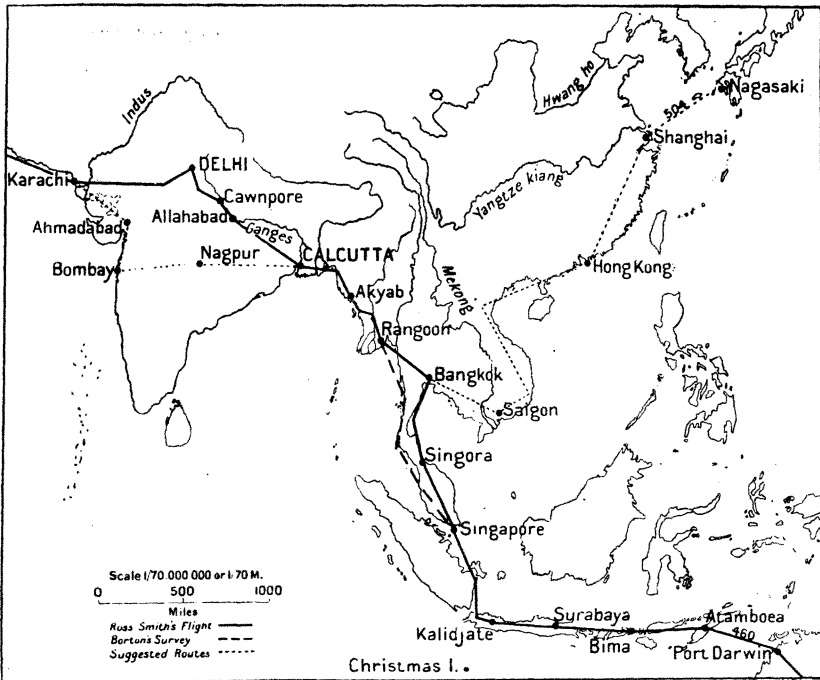
EGYPT TO INDIA: THE CITY OF DAMASCUS



THE CITY OF SAMARRA

tainous nature of the country and scarcity of possible landing-grounds render a direct course undesirable. From Bundar Abbas to Karachi *via* Charbar it is once again a question of skirting the seaboard owing to the inhospitable and mountainous country on a point-to-point course. Other aerodromes which exist on this route have at present only been organized as emergency landing-grounds.

Once in India, there are several alternative routes in the trans-Indian journey. The two principal routes cross India from west to east, both starting from Karachi, which is from a flying point of view the gate of India. The northern route proceeds to Nazariabad, thence striking north-

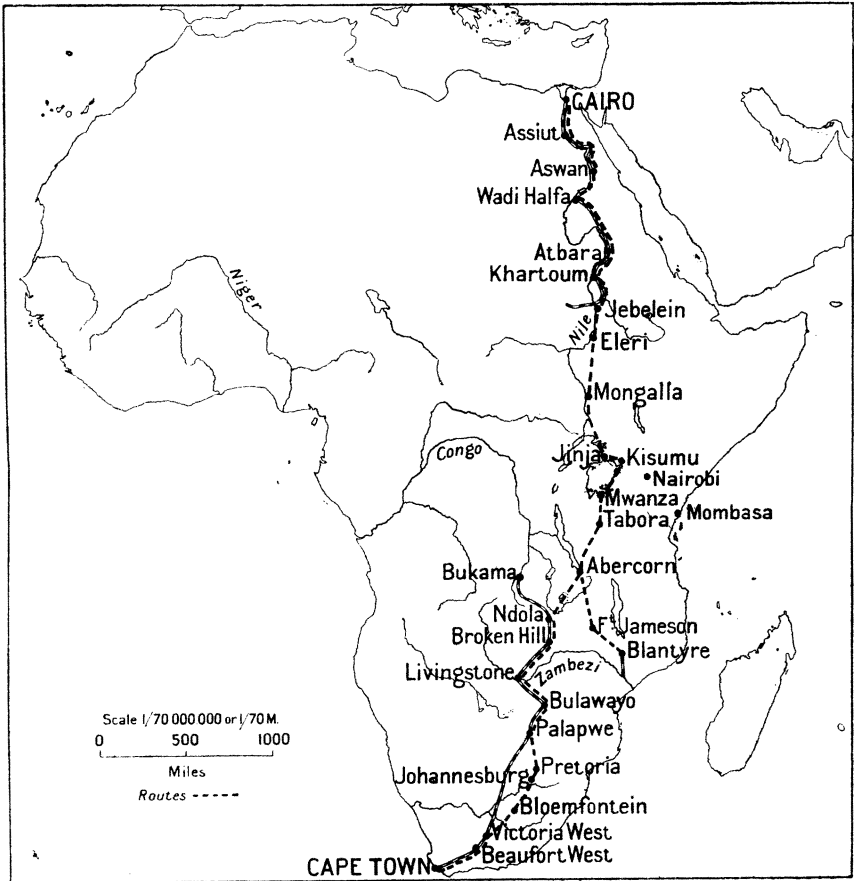


Air routes across India

east to Delhi, and so to Calcutta *via* Cawnpore, Allahabad and Gya. On this route there are a number of other aerodromes which offer facilities in case of emergency. The more southerly and direct route, though at present not quite so well served with intermediate stopping-places, is that *via* Bombay, our first stage from Karachi being Ahmadabad, whence the course more or less follows the Bombay and Central India Railway to Kalyan (the aerodrome of Bombay). The route on to Calcutta is almost due east, passing through Nagpur. Other aerodromes are under construction at Raipur and Jharsuguda.

In connection with the Egypt-India route the Indian Post Office has inaugurated a mail service between Bombay and Karachi, which will accelerate the delivery of letters in the Provinces of Sindh and Baluchistan,

Cairo to Cape Town.—Perhaps of all the aerial routes which I have touched on, none appeals more strongly to the imagination than that stretching through the seasons from Cairo south over the vast Sudan, on through the huge and tangled stretches of equatorial Africa, and across the veldt to Cape Town. The stepping-stones of this great all-red route have been actually placed, and pioneer machines are now on the way. To have established a chain of aerodromes through the length of the



Air route: Cairo to Capetown

continent of Africa, a distance by existing methods of travel of 6223 miles, to have successfully contended with the geographical and physical difficulties, is no small achievement. Yet such a route actually exists to-day and I think the survey parties deserve great credit for the work they have accomplished.

From Cairo the course of the Nile is followed to Wadi Halfa and thence across the desert to Sheriek, from which place the Nile is once

more the airman's guide to Khartoum. Across the desert areas from Cairo to Khartoum natural aerodromes, requiring little improvement, are readily available. The southern end of this zone marks the terminus of the Egyptian-Sudan railways at Senaar. With the Sudd districts of the White Nile, an area of some 35,000 square miles of swamp, and the forests of the southern Sudan between Khartoum and Mongalla, the difficulties of aerodrome construction are very materially increased. Between Mongalla and Jinja, which it is interesting to note is 2132 feet above sea-level, on the northern shore of Lake Victoria, an emergency landing-ground has been established at Nimule on the southern boundary of the Sudan.

From Jinja, Lake Victoria is skirted on the eastern shore, and the next stopping-place is Kisumu, on the north-eastern corner of the lake—an important point, the terminus of the Uganda railway to Nairobi and Mombasa. The stage Kisumu to Mwanza takes us to the southern end of Lake Victoria, there being an intermediate landing-ground at Shirati. Though all this section of country is far from easy, greater troubles lie ahead.

From Lake Victoria to Abercorn in Northern Rhodesia *via* Tabora (the late capital of German East Africa) is a difficult piece of country. A large stretch of Central African forest is unpleasant to contemplate as a possible enforced stopping-place, although, owing to the energy of our survey parties and the good will of the local authorities, even here emergency grounds have been made available at Shinyanza and Zimba.

It is interesting in considering country of this description to draw a comparison as to the possibilities of a journey by the ordinary means available as opposed to an aerial journey. For instance, from Mwanza to Tabora, some 170 odd miles, would involve a trek of anything from five to fifteen days with all the attendant difficulties of porters, etc., points which I need not labour to Fellows of this Society; the aeroplane will probably accomplish the same stage in about two hours! Such examples emphasize the possibilities of aerial routes when spanning undeveloped country of this character to be found in equatorial Africa.

From Abercorn there is a further difficult stretch to Broken Hill, and an emergency ground has been prepared at N'dola. The journey from Abercorn to N'dola is 341 miles. This is the longest stage on the entire route without a prepared emergency ground, but the intermediate country has been surveyed and more than one place reported on as offering landing facilities in the event of necessity. From N'dola to Broken Hill and onwards to Pretoria *via* Livingstone, Bulawayo and Palapwe (where we have benefited so much from the assistance of Chief Khama) the route roughly follows the railway, and although the dense forest country in the neighbourhood of Livingstone naturally presents difficulties, the journey, in view of the many facilities which are now within reach of every stopping-place, is not a bad one.

The next aerodrome is at Johannesburg, 6000 feet above sea-level, the greatest elevation on the route. From here there is a gradual falling in the elevation of the aerodromes to Cape Town. Bloemfontein, Victoria West, and Beaufort West all have aerodromes on the route, and in view of the difficulty of the Zwarfe-Bergen range, which it is necessary to cross before reaching Cape Town, an emergency landing-ground has been established at Touws River. This has been found necessary because the top of the mountain range referred to—which will necessitate a climb of well over 7000 feet—is often covered with low clouds, rendering the actual approach to Cape Town somewhat dangerous. Generally speaking, the latter stages of the journey across the Transvaal and Cape Colony have not presented anything like the difficulties encountered further north, the more open country lending itself better to the requirements of the aviator, although frequently the veldt country with its rocky kopjes has made the selection of landing-grounds difficult.

In considering the whole route, it is interesting to record that there are no less than forty-three prepared aerodromes, giving forty-two stages of an average length of just over 124 miles each. Of the forty-three aerodromes twenty-four are at present organized as petrol and oil stations, giving an average journey of 226 miles between refuelling bases. The total distance to be covered is approximately 5206 miles.

In Africa special consideration has been given to the inauguration of a mail and passenger service from Cairo along the course of the Nile to Khartoum and on to Kisumu on Lake Victoria. Under present conditions certain stages of this journey have to be conducted by carriers, a method both slow and expensive. It appears that here at any rate the most economic mode of travelling would be by air, particularly as it seems doubtful whether a Cape-to-Cairo railway would pay over this section of its line.

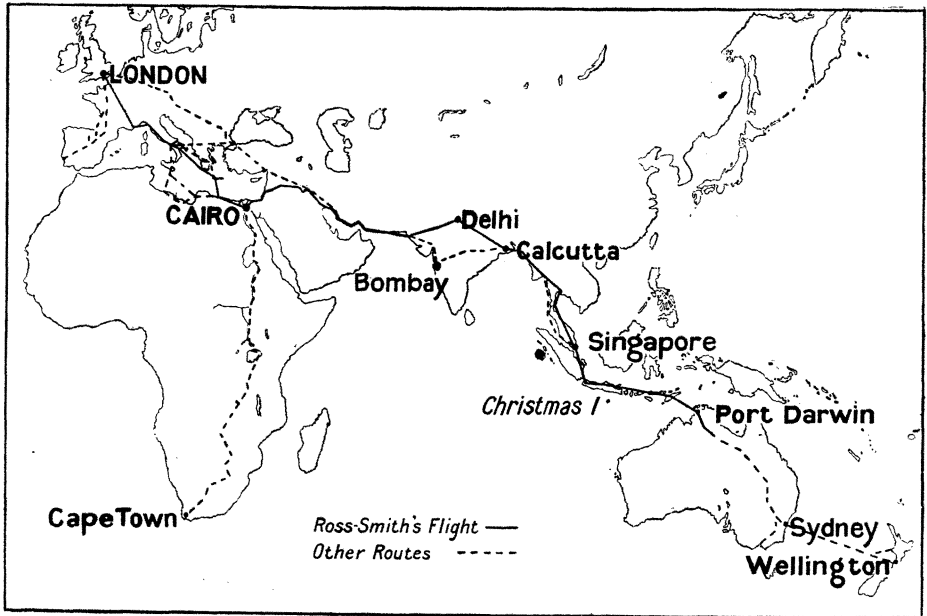
India to Australia.—From Calcutta the route to Australia as flown by Sir Ross Smith is *viâ* Akyab to Rangoon; and thence, after skirting the coast of Burma for about 100 miles, it strikes across country to Bangkok. Here some hazardous flying over a very mountainous district is involved. The next stage from Bangkok necessitates a journey down the Gulf of Siam to Singapore. Here again geographical conditions are difficult, the ground being extremely precipitous.

Leaving Singapore, flight is continued to Kalidjati in Java, and on *viâ* Surabaya and Bima to Atamboea in Dutch Timor, which is within 450 miles of Port Darwin. All the latter stages of this journey involve very material difficulties, as it is a question of flying over either islands inhospitable from the point of view of possible landings, or over the sea.

The alternatives to this route are (1) by skirting the western coasts of Burma and the Malay Peninsula instead of crossing the mountains to Bangkok. Several possible landing-grounds have been reported in this area as the result of a survey recently undertaken by General A. E. Borton;

and (2) by the use of a flying-boat from Calcutta *via* Akyab, Rangoon, Mergui, Penang, Singapore, Muntok (Banka), Batavia, Surabaya (Java), Bima, Keopang Bay (Timor) and so to Port Darwin. If the latter method be adopted, undoubtedly many of the geographical disadvantages and difficulties which a land machine suffers would disappear, as sheltered harbours suitable for flying boats exist.

Should it prove desirable to establish a British route, the journey from Singapore to Australia may perhaps at some future date be broken at Christmas Island, south of Java, 810 statute miles from Singapore, and 949 miles from the coast of Australia. Though I am unable to say what the difficulties will be when aerodrome construction comes up for serious



Air route: London to Australia

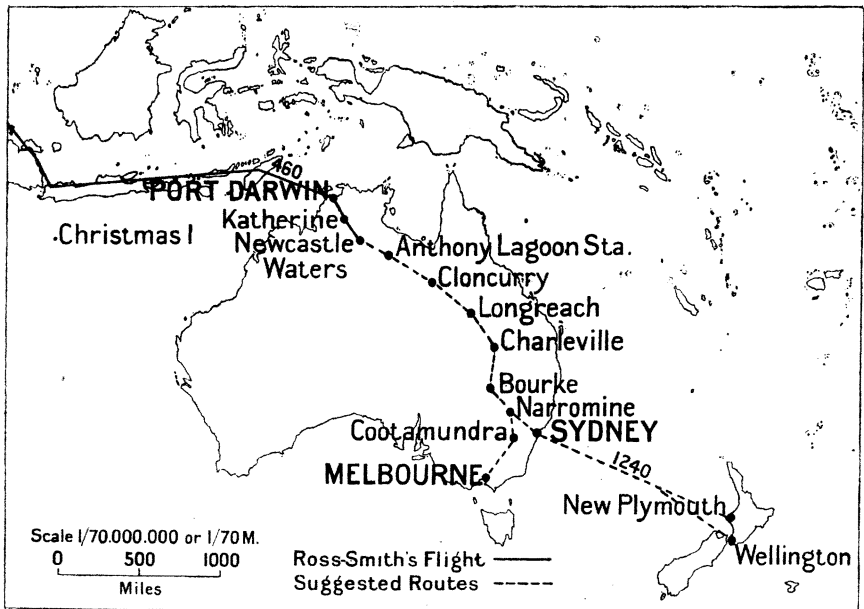
consideration, yet the presence of a central plateau would seem to suggest possibilities. One has, however, in passing criticism feelings of misgiving as to the comfort of the aviators of the future at Christmas Island, where the original inhabitants would seem to consist solely of large land crabs of a roving disposition and voracious appetite, not to mention various rodents of equally unattractive character. But after the difficulties that have been met with and surmounted in Central Africa, I feel that an aerodrome on Christmas Island may well be the stepping-stone between India and Australia, despite the land crabs. Incidentally I hope that some day there will be a link between this route and one to China.

In Australia one of the chief disadvantages of the present transport system is the lack of a trans-continental railway between the populous

T

districts in the south and the sparsely populated country of the north. A trans-continental air route such as has been opened up from Port Darwin to Melbourne, with some eleven aerodromes either constructed or in course of construction, may well prove the most economical method of carrying mails, light packages, and even passengers. The actual journey has already been flown both ways.

New Zealand with its long seaboard seems chosen by nature for the use of seaplanes. Proposals have already been put forward for the creation of an air mail service between Auckland and Wellington, Wellington and Christchurch, and there can be no doubt from the reports received that such a service would entail a great saving of time ; but



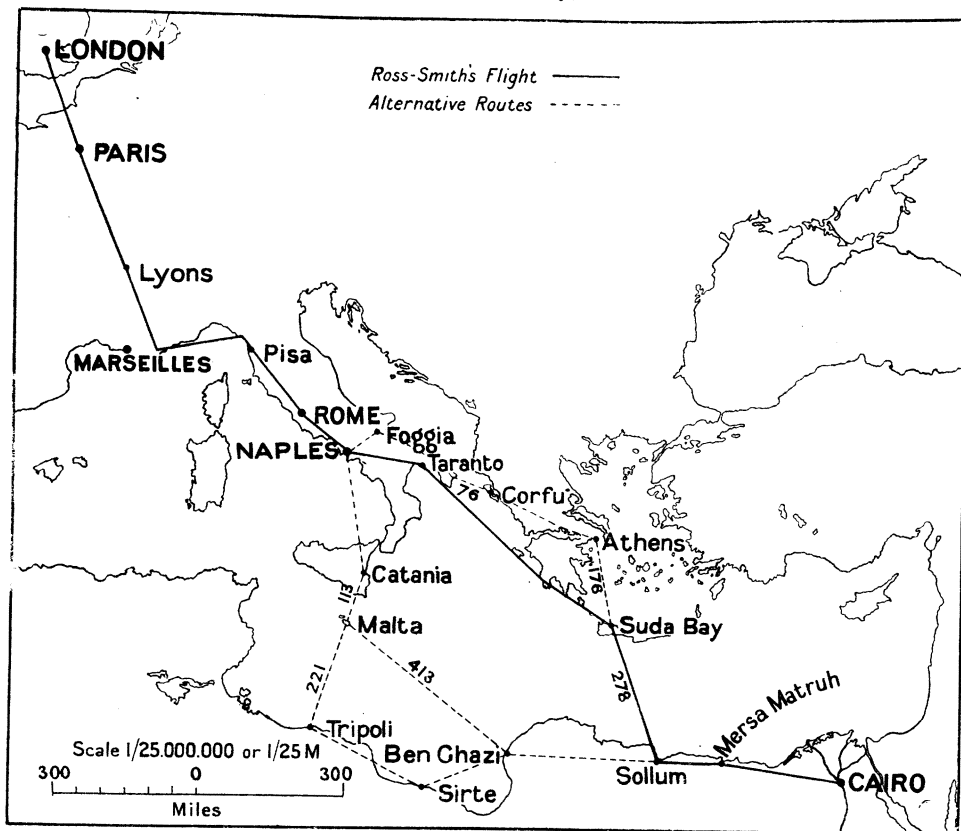
Air route across Australia

the high winds encountered render steady aerial navigation somewhat difficult.

England to Egypt.—Although, perhaps, the aerial route from England to Egypt is the best known, the journey having been flown numerous times during the last couple of years, it is by no means easy. Between Paris and Lyons the course is over typical north-eastern French country as far as Auxerre, and a forced landing, if necessary, may be made safely almost anywhere. South of Auxerre the country becomes more hilly and wooded, and difficulties increase, although no really high ground is passed. From Lyons the valley of the Rhone is followed as far as Marseilles, and presents few difficulties to modern aircraft.

The next stage to Pisa is long and difficult, as, in view of the hilly

nature of the country along the coast and the comparatively few landing-grounds available, it has been found better to take a more or less direct over-sea course of nearly 200 miles. From Lyons, however, an alternative route over the Mont Cenis Pass may be taken by proceeding *via* Chambéry and Modane across the Italian frontier to Turin. Aerodromes exist both at Chambéry and Turin, and possible landing-grounds are available in the neighbourhood of the railway nearly as far as Modane. Through the pass itself there is a stretch of bad country, but the total distance offer-



Air routes: London to Cairo

ing difficulties does not perhaps exceed 50 miles; and although Mont Cenis is 11,600 odd feet in height, the pass is only some 6000 feet.

Beyond Turin it is good flying country, and the course lies south of Milan to Bologna and down the eastern coast of Italy to Foggia. This route has been favourably reported on, and, in view of its directness, is one worthy of close consideration. Geographically, Italy is peculiar from a flying point of view, owing to the height of the central range, but in the northerly or southerly flight it is possible to travel over the coastal plain to Rome with many intermediate landing-grounds available. At Rome

an alternative route is possible by crossing to Foggia, a flight which involves a climb to nearly 10,000 feet; from Foggia to Brindisi or Taranto; and so across the Straits of Otranto to Athens. This last stage covers some very difficult and mountainous country.

From Athens to Suda Bay is an overseas flight of about 170 miles. The island of Crete is not ideal from the aviator's point of view, the mountains being of such a height as to involve a climb of between 9000 and 10,000 feet before the journey southwards can be continued, unless the island be circumnavigated. From Crete to Sollum on the North African coast is 242 miles over the Mediterranean. Thence following the coast to Alexandria the flight to Cairo is completed usually under favourable meteorological conditions.

To return to Rome: if instead of utilizing the alternative I have just described, a course continued down the west coast of Italy is taken, a further landing-place is available at Naples, thus making the journey to Africa *viâ* Malta with a possible landing at Catania in Sicily. The advantages of this route are obvious, as it involves crossing the territory of two foreign powers only, but the actual mileage is greater, and the oversea portion long. A permanent aerodrome has not been constructed in Malta as yet, but the point is under consideration, although owing to the rocky nature of the island there are considerable difficulties to be faced.

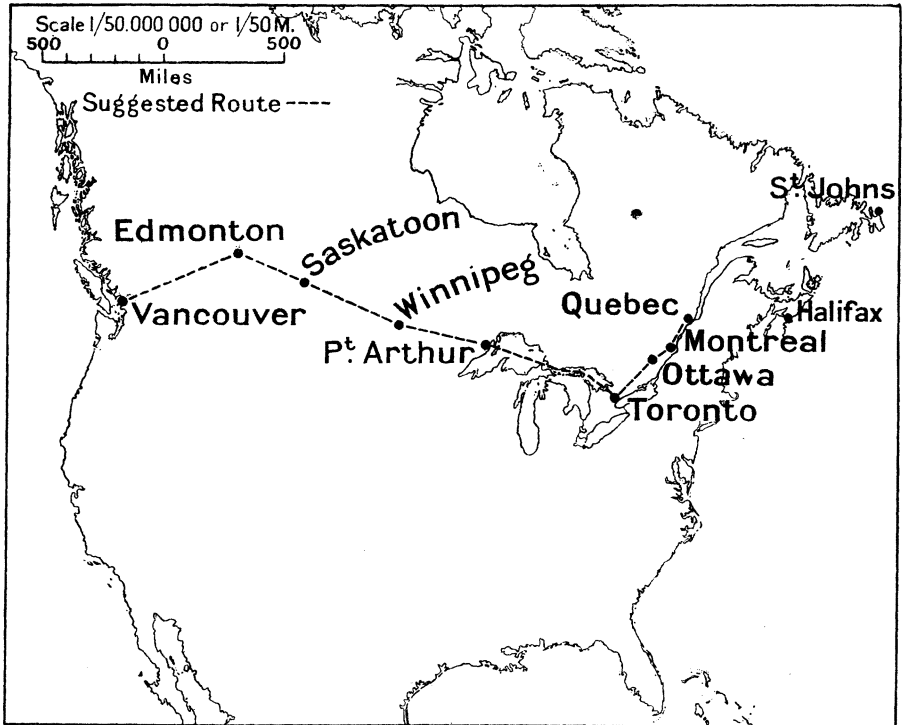
From Malta to the African coast, if Tripoli be our objective, is about 210 miles. On the other hand, Ben Ghazi, although involving a long oversea stretch of about 400 miles, is considerably more direct. Whichever course is chosen, once the African coast is reached the flight to Egypt presents comparatively few difficulties. All the North African desert country makes up to a certain extent for its general absence of civilization by the good landing facilities it offers.

England to Canada.—So much has already been said and written on the subject of the Atlantic flight that I do not propose to deal with it at length. The difficulties of the trans-Atlantic journey are well known. But they are difficulties which have been surmounted, and will gradually diminish. From Cork in the south of Ireland to St. John's, Newfoundland, is a journey of 1935 statute miles. Once in Newfoundland, the journey to the mainland is relatively simple—some 600 miles to Halifax; thence to Quebec and Montreal.

Great possibilities are open for the development of aerial routes from Montreal across the continent, touching, for instance, at Toronto, Port Arthur, Winnipeg, Saskatoon, Edmonton—Vancouver being the ultimate goal. The use of flying-boats in Canada will undoubtedly be greatly developed owing to the large amount of open water in innumerable lakes, and after what has already been accomplished in the establishment of aerial routes, it does not call for much imagination to conceive a flying-boat route spanning the entire continent.

Canada, as a whole, offers a good example of the geographical con-

ditions affecting ordinary commercial intercourse by air and the utility of aircraft in providing the means of developing virgin lands where neither railways nor telegraphs have yet penetrated. For instance, an air route employing either land or water aircraft might be established on the line of the Great Lakes, linking up the commercial centre of Montreal with Port Arthur, the gateway of the West, then onwards to Winnipeg, whence lines could radiate into the North-West. Or, again, an air organization could assist the settlers who are ever pushing their habitations and



Air route across Canada

carrying civilization into the northern districts of Quebec, Ontario, and the Prairie provinces.

Before concluding, I ask, What of the future? We are still at the experimental stage of aviation. It is essential for those who are responsible for its development to show imagination and foresight. It is not sufficient merely to keep abreast of immediate requirements. Sound finance and an economic system are the bed-rock of Imperial commercial aviation. Though charges are at present high, the great speed of aircraft, the absence of road or rail wear and tear, are both in its favour. Increased public confidence and consequent increase in traffic will rectify cost.

But in the meantime how is the machine to be kept working? How much responsibility must be assumed by the State? State ownership has its champions, but is against British instinct. The principle is generally accepted that bureaucratic control destroys competition and initiative. The State can help in the organization of the great routes which I have described; in meteorological and wireless services; in the institution of research and experiment. But for a time, at any rate, it must do more. It must be recognized that though private enterprise must itself be vigorous and independent in its methods, at the beginning the British aircraft industry cannot live unsupported. Direct assistance is a necessity. Subsidized competitors are in the field. France is straining the pace; Italy is pushing her interests; the United States is grappling with the problem; Germany is making efforts. The sign-posts are clear. An Empire policy must be formed. In the no distant future, after the crucial domestic problems arising out of the war have received first treatment, the Imperial and Dominion governments must define and adopt a considered policy towards aviation.

It is not enough to believe—as I firmly do—that aerial transport being right is bound eventually to succeed. The seasoned tree can stand alone—the shooting sapling must be stayed.

Some of the requirements of aviation on an Empire basis are—

1. The maintenance of a highly efficient fighting force.
2. The expansion of commercial aviation to promote British trade and to supplement the fighting force when necessary by a reserve of personnel and material, knowledge and experience.
3. The co-ordination and co-operation of aerial communication throughout the Empire, and its relations to other countries.
4. The organization of routes, aerodromes, ground communication and meteorological services on an Imperial basis.
5. The energetic promotion of research and encouragement of design.
6. Money to assist the institution of experimental mail services.
7. The encouragement of land survey, forest patrol, and other work in which aircraft can be utilized.

There are great handicaps from physical, technical, operational, and financial points of view, but the strides which aviation has made in the past will be more than equal in the future. The deadening blanket of scepticism or apathy which undoubtedly exists in official, commercial, and, in fact, in every grade of society, and which has always greeted the birth of any new great development in the normal activities of the world, will gradually disappear. Every decade has had its doubting Thomas. The responsibility must be faced. If it is I am quite certain that that initiative and grit which has always enabled this country and the Empire to lead the world will not let us lag behind in this new and all-important branch of human activity. This year will, I hope, go down to history as marking the birth of a sound, virile, and truly Imperial air policy.