

REPORT

ON

THE PROGRESS OF CIVIL AVIATION, INDIA

1932-33



GOVERNMENT OF INDIA

DIRECTORATE OF CIVIL AVIATION.

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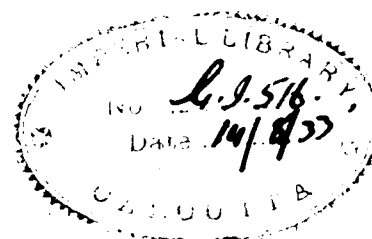
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INTRODUCTION.

This report is compiled to cover developments in the period up to the 31st March 1933, but all statistics are given for the calendar year 1932, for ease of comparison with those of other countries.

In spite of retrenchment, both in Government and private expenditure, the year has not been without development in civil aviation. Perhaps one of the most important features of the year, however, is the ever-growing accumulation of signs of widening interest in aviation, and particularly an awakening of interest in the possibilities of commercial aviation in India. This has sprung, not only from a possibly envious observance of the benefits conferred by air transport in other countries, but also to some extent, as might naturally be expected, from the fact that there is a growing body of trained pilots in the country, who have naturally turned their attention to the useful employment of their accomplishments, while at the same time the Clubs have spread their activities from their own centres into more and more surrounding localities.

An increasing number of Indian States is taking up flying and providing flying organisations. From Jodhpur, which easily retains the lead, the movement has spread to the Kathiawar States, to Patiala and finally to Hyderabad.

In actual commercial development the year is marked by the beginning of air transport operations by Indian organisations, two Indian air mail services having been inaugurated with a total of 2,010 miles of route operated.

The year closed with very definite indications that the development which has now begun is the beginning of an expanding phase, many results of which should be apparent within the next two years.



By courtesy of Indian Air Survey and Transport Ltd.

CALCUTTA -BY INFRARED PHOTOGRAPHY.

The photograph taken from a height of 13,000 feet in poor visibility shows a range of about 75 miles. In the middle distance is the Howrah bridge crossing the Hooghly river; in the left foreground the Mariani and on the right the marshes which adjoin Calcutta.



By courtesy of Indian Air Survey and Transport Ltd.
CALCUTTA (DUM DUM) AERODROME (Looking N. E.)
One of the major aerodromes on the trans-India route, showing the tanks formed by excavation of soil used in making up the aerodrome. In the background, the Government hangar and in the upper left hand corner the new club house of the Bengal Flying Club.

SECTION I.—REGULAR AIR SERVICES.

INDIAN INTERNAL SERVICES.

The most important development during the year was the inauguration, on the 15th October 1932, of the Karachi-Bombay-Madras air mail service, operated by Tata Sons Ltd. The Karachi-Delhi air mail service was operated throughout the year by the Delhi Flying Club. Both these services operated weekly in connection with the Imperial Airways service from London to Karachi. The total mileage of internal air mail services is now 2,010, made up as follows—

	Miles.
Karachi-Delhi	690
Karachi-Madras	1,320
TOTAL	2,010

(1) *Karachi-Bombay-Madras Air Mail Service.*—A ten-year agreement between the Government of India and Messrs. Tata Sons Ltd., has been effected for the operation of a weekly air mail service between Karachi and Madras *via* Bombay, connecting with Imperial Airways' service between Karachi and Europe; the service was inaugurated on the 15th October 1932. The stopping places on the route are Karachi, Ahmedabad, Bombay, Bellary and Madras. The mileage is given below:—

	Miles.
Karachi-Ahmedabad	385
Ahmedabad-Bombay	275
Bombay-Bellary	390
Bellary-Madras	270
TOTAL	1,320

The service has been operated by two De Havilland Puss Moth aeroplanes capable of carrying a load of 350 lbs. of mail and cruising at 105 miles per hour. A De Havilland Fox Moth has now been added to the fleet. The service is operated by a European pilot manager and an Indian pilot. Provision has not been made for the carriage of passengers. The saving of time over the existing surface means of transport to and from Karachi is approximately as follows—

<i>Southbound.</i>	
Ahmedabad	1½ days.
Bombay	1½ "
Madras	2½ "
<i>Northbound.</i>	
Madras	2½ "
Bombay	1½ "
Ahmedabad	1½ "

The service was regularly operated up to the end of the period under review, viz., 31st March, but on one occasion there was a delay of one day in the southbound service, due to unserviceability of machines, in addition to the delays in the southbound service caused by late arrival of the overseas service.

Statistics covering the operations to the end of the calendar year 1932, will be found in Appendix I.

Negotiations for the extension of the Karachi-Madras air mail service to Colombo are in progress. As soon as agreement is reached, steps will be taken towards the commencement of the service which, it is hoped will be inaugurated not later than October 1933. The mileage of this section of the route is 425. No intermediate stops are contemplated and the service will probably be operated by seaplane or amphibian.

(2) *Karachi-Delhi Air Mail Service.*—The Delhi Flying Club continued to operate the air mail service between Karachi and Delhi throughout the year 1932. The agreement was renewed on the 31st December 1932, the date of its expiry.

The route mileage of this service is as follows :—

	Miles.
Karachi-Hyderabad*	100
Hyderabad-Jodhpur	290
Jodhpur-Delhi	300
TOTAL	690

*NOTE.—Hyderabad is a stopping place only on the westbound service.

The night stop at Hyderabad for connection with the southbound Punjab mail train proved of considerable value, particularly during the summer when the Government of India are located in Simla. As from the 15th October, the mails for south India were carried by the Tata service and the arrangement for the Jodhpur-Falna connection ceased. In spite of the considerable weight of mails transferred from the Delhi service in consequence, the normal growth of air mail traffic operated to maintain the average load without decrease. The only other operational change during the year was necessitated by the strong westerly winds during the summer months and the absence of night lighting organisation. To meet this difficulty, the scheduled time of departure from Delhi was changed for that season from 09-30 to 07-30, which resulted in some minor late train connections being no longer available. Floodlights have now been provided, and it is hoped that this will obviate the necessity for a change during the monsoon of 1933.

Although 104 services were operated, there were only three occasions when the westbound service failed to make connection with Imperial Airways at Karachi, two of these being due to forced landings on account of weather (sandstorms and thunderstorms) and one due to forced landing on account of mechanical failure.

The total weight of mail carried during the calendar year 1932 was 10,066 lbs.—an average of 99.6 lbs. per flight—compared with 8,295 lbs. in the previous year (Charter Service).

The service was operated with a De Havilland Gipsy II Moth with a De Havilland Puss Moth as relief machine. It is worthy of note that, except on one occasion, the service has been operated by an Indian pilot entirely trained by the Delhi Flying Club.

Statistics covering the operations during the calendar year 1932 will be found in Appendix II.

(3) *Projected developments.*—Negotiations, which were carried on during the year for the establishment of an air mail service from Karachi to Moghal Serai, to improve the service to Calcutta and in substitution for the Karachi-Delhi service, were abandoned in favour of a larger scheme to form part of an extension of the British air service to Australia. At the time of this report, negotiations are still in progress, but it is expected that they will result in the establishment of an air service across India during 1933.

EXTERNAL AND FOREIGN AIR SERVICES.

(1) *Imperial Airways' London-Karachi Air Service.*—Throughout the year the service was operated to the same time table :—

<i>Eastbound.</i>	
London dep.	Saturday.
Karachi arr.	Friday.
<i>Westbound.</i>	
Karachi dep.	Wednesday.
London arr.	Tuesday.

The four engined Handley Page 42 type of aeroplane was used throughout the year, and did much to establish an enhanced reputation for the comfort of the service.

Changes in the route, of considerable importance, took place during the year. These, while not directly the concern of India, were of interest to the Indian public.

(i) The most important change took place on the 1st October 1932. Hitherto the service had been operated, since 1929, along the Persian shore of the Persian Gulf, *via* Basra, Bushire, Lingeh, Jask and Gwadar. The permission of the Persian Government to operate along this route, which had been twice temporarily extended, expired on the 30th September. With the co-operation of the Sheikhs of Bahrein and Sharjah, a route was organised along the Arabian shore of the Gulf and the service is now operated *via* those places and rejoins the original route at Gwadar.

(ii) In order to shorten the route across the Mediterranean, which had hitherto been operated *via* Cairo, duplicate flying boat services were operated for the African and Indian services throughout the year.

As the result of this change the Indian service operated *via* Athens, Cyprus and Galilee, where the change from flying boat to landplane was made for the flight to India, *via* Rutbah Wells and Baghdad. Whilst the change had excellent results during the summer, it was found that the intense storms and strong winds encountered in the neighbourhood of the mountains of the Asia Minor mainland during the winter, combined with the long refuelling stages, had a very serious effect on the punctuality of the service, which gave rise to much criticism in India. To avoid these conditions during the bad period, a reversion to the original route *via* Athens and Alexandria was effected in January 1933. An immediate improvement in punctuality was recorded.

Statistics with regard to the regularity of operation of the service are combined with those of other services now carrying Indian mails and mails to India in Appendix III, for the years 1931 and 1932.

The actual time taken by the service on flights eastbound and westbound, between London and Karachi is shewn below :—

EASTBOUND.		WESTBOUND.	
No. of flights.	Day of arrival.	No. of flights.	Day of arrival.
36	7th	36	7th
6	8th	12	8th
7	9th	3	9th
4	10th	1	5th
TOTAL . 53	..	52	..

The scheduled day of arrival is the seventh day from the day of departure, which means that the actual elapsed time on the eastbound flight is approximately 6 days and on the westbound flight 6 days and eight hours.

The saving of time which this represents, as compared with the sea mail service, is, in some parts of India, considerably diminished by the absence of internal air mail services, and the lengthy train journey from Karachi. So far as South India is concerned, this disadvantage has been wholly removed by the inauguration of the Karachi-Madras air mail service.

There have been only comparatively slight increases in the weight of air mails carried on the service as compared with 1931, a result no doubt due in part to the trade depression.

	TO INDIA.		FROM INDIA.	
	1931.	1932.	1931.	1932.
	lbs.	lbs.	lbs.	lbs.
Mails for India	45,632	45,111	40,474	42,407
Transit mails	840	1,766	2,592	4,299
TOTAL	46,472	46,877	43,066	46,706

Complete mail statistics are given in Appendix IV, combined with the figures for foreign services. Further operational statistics, including traffic figures of passengers and freight, are given in Appendix V. A point worthy of note is that the passenger traffic increased approximately 50 per cent as compared with the previous year.

(2) *K. L. M. (Royal Dutch Air Lines) and Cie. Air Orient (French Air Services).*—No new foreign services were inaugurated during the year under review. Both the Dutch service from Amsterdam to Batavia, and the French service from Paris to Saigon were operated throughout the year.

The number of flights carried out by the Dutch (K. L. M.), and French (Compagnie Air Orient), services across India during the year 1932 was :—

	Eastbound.	Westbound.	TOTAL.
Dutch	52	52	104
French	43	43	86

From the 15th May 1932, the French (Compagnie Air Orient) service was operated weekly in each direction; both the Dutch and French companies now run their services on a weekly basis. The Dutch service continued to be operated mainly by Fokker F XII and F XVIII aircraft, and the French service by Fokker F VII.

An important change of policy with regard to the use of these services for the carriage of Indian air mails was given effect on the 27th September 1932. Hitherto they had carried mails to India and had delivered them to the Postal authorities at the aerodrome of entry. Both services are now used for the carriage of air mails to countries east of India which are served by them, *viz.*, Siam, Indo-China, Federated Malay States and Netherlands East Indies. In addition, the services are used for the carriage of air mails from Rangoon to

Calcutta, which are consigned by the Delhi-Karachi service and thence by Imperial Airways to countries in the west.

Statistics with regard to the weight of air mails carried by these services to and from India are given in Appendix IV.

Operational statistics, including passenger and freight traffic data are combined with those of Imperial Airways in Appendix V.

Statistics with regard to the regularity of operation of these services are combined with those of Imperial Airways in Appendix III.

IMPORTS AND EXPORTS BY AIR.

There was a notable increase both in the number of aircraft cleared and in the value of imports and exports by air through Indian air ports.

The number of aircraft arrivals from abroad was 271 compared with 179 in 1931. The number of aircraft departures for abroad was 268 compared with 176 in 1931.

Compared with a value of Rs. 1,50,601 merchandise imported in 1931, the value in 1932 was Rs. 8,28,786 which included a consignment of diamonds valued at Rs. 4,17,169. The imports of bullion and currency notes declined from Rs. 1,06,801 to Rs. 33,766.

The exports of merchandise were small, amounting to Rs. 15,353 compared with Rs. 4,286, but the exports of bullion and currency notes increased from Rs. 14,54,790 in 1931 to Rs. 24,58,563 in 1932.

Detailed statistics are given in Appendix VI.

SECTION II.—FLYING CLUBS AND PRIVATE FLYING.

(1) *Flying Clubs*.—On the whole good progress in the flying club movement was maintained, the only set back being the cessation of the activities of the Punjab Flying Club. A summary of the work of the flying clubs is given in Appendix VII.

The flying clubs at Karachi, Delhi, Bombay, Calcutta and Madras continued operations on a subsidised basis. The Government subsidy was reduced, as compared with the previous year, by an amount of Rs. 6,000 for each club, the basis of payment being as follows :—

	Rs.
Fixed subsidy	17,000
Bonus at the rate of Rs. 100 for each pilot trained <i>ab initio</i> and licensed. (Maximum).	2,000
TOTAL	19,000

The Aero Club of India and Burma, which, in addition to its function of representing the Federation Aeronautique Internationale in India, and its responsibility for the organisation of the sport of flying

and air touring, is responsible for assisting Government with the administration of the flying clubs and co-ordinating their activities, also suffered a cut in subsidy from Rs. 20,000 to Rs. 16,000.

It may be noted here that it has been decided to impose further cuts in the subsidy for the financial year 1933-34. The flying club fixed subsidy will be reduced to Rs. 16,000 and the Aero Club subsidy to Rs. 5,000. These cuts will provide funds for the payment of a subsidy to the United Provinces Flying Club in 1933-34.

The Cawnpore and Lucknow centres of the Delhi Flying Club continued operation throughout the year, and at the end of the year arrangements were made for their incorporation as a separate United Provinces Flying Club, which will receive a Government subsidy. The Club has received a good measure of private support. One aeroplane and a hangar for Lucknow have been donated while funds have been collected for a hangar at Cawnpore. Operations will continue at both centres. There is evidence that the establishment of this new club will arouse interest and enable occasional facilities for flying to be provided in the eastern United Provinces and Bihar.

The Jodhpur Flying Club, though handicapped by small membership and unable therefore to produce results comparable with those of the larger centres, continued to operate. Its value as an established flying centre, however, is out of proportion to the actual number of hours flown. The maintenance of Jodhpur as a flying centre for private flying, and its development as a commercial aerodrome are due to the keen interest taken by His Highness the Maharajah. Towards the end of the year, two Monospar aeroplanes were purchased and arrangements made for the Club to provide agency and service facilities for this type of aircraft.

Despite lack of Government support, the Kathiawar Flying Club came into active existence in April 1932. It was at first centred at Rajkot in Kathiawar, but later moved its headquarters to Ahmedabad, where it is established on the Military landing ground. While it was established by individual initiative and is supported by private financial assistance, it is becoming organised as a membership club. Rajkot is still maintained as a branch centre. Two pilot instructors are employed.

Government support was withdrawn from the Punjab Flying Club on the expiry of the agreement in March 1932. The Club ceased to operate, having no serviceable aircraft and no staff. Steps were taken to apply for the liquidation of the Club, and a Receiver was appointed in March 1933. The initial steps in the formation of a new Club at Lahore have been taken and it is hoped that this will come into operation during 1933.

The Madras Flying Club have made arrangements to extend their activities to Trichinopoly. The Bengal Flying Club considerably improved the amenities of the Club by the provision of a new Club house on the Dum Dum aerodrome. The Bombay Flying Club which has

always made a practice of extending its activities to surrounding centres continued to do so. During the monsoon, the whole of the operations of the Club were transferred to Poona.

The total membership of the flying clubs in India suffered a decrease on account of the demise of the Punjab Flying Club, which had a large membership. The figures were 1,538 in 1932 (December) as compared with 1,880 in 1931. There was an increase in the total number of aircraft owned by flying clubs from 20 in 1931 to 26 in 1932. There was also an increase in the total number of hours flown from 9,070 to 9,717. In view of the smaller number of pilots trained, this must be partly ascribed to greater activity in passenger flights, and hence represents a widening of interest in flying.

On account of the closing of the Punjab Flying Club and a temporary suspension of activities (for leave purposes) of the Karachi Aero Club, there was a decrease in the number of pilots trained *ab initio* from 113 to 85. Of this number 44 were Indians and 41 Europeans. Several of the clubs turned their attention to the advanced training of pilots who wished to take up flying as a profession. The following numbers were trained and obtained the appropriate licence :—

Pilot Instructors	1 (Madras).	
B. Licence (Full Commercial Pilot's Licence)	2 {	Bengal . 1
		Delhi . 1
A1. Licence (Limited Commercial Pilot's Licence)	5 {	Madras . 1
		Delhi . 3
		Bombay . 1

In addition, a trainee of the Delhi Flying Club who has been taught *ab initio*, and successively obtained his "A" and "B" licences, was given a grant of Government assistance, and sent to an instructor's school in England for a full course as a pilot instructor. He passed through the course with distinction and was thereafter granted a Pilot Instructor's Licence.

The total number of passengers carried by the flying clubs on taxi and short pleasure flights, was 4,972 compared with 3,247 in 1931.

The number of hours flown by privately owned aeroplanes was approximately 682.

There has been a natural increase in the number of personnel engaged by the Flying Clubs. The figures at the end of December 1932 were :—

	Technical.	Clerical.	Menial.	TOTAL.
Europeans	16	..	..	16
Indians	23	23	62	108
TOTAL	39	23	62	124

During the year, there has been a large extension of the training facilities in aircraft engineering offered by the flying clubs. It has to be understood that the facilities are somewhat limited on account of a number of factors among which may be noted (1) that the clubs are primarily organised for flying training and the time of the fully qualified ground engineers available for instruction is limited; (2) that the clubs have not large and well equipped workshops; (3) that the types of aeroplanes and engines used are limited to two or three. Nevertheless, with these limitations in mind, it has been possible for mechanics employed by or apprenticed to the clubs to be trained to the standard necessary to qualify for a limited ground engineer's licence. During the year three ground engineers licences have been issued, after examination by the staff of the Directorate of Civil Aviation, to mechanics trained by the flying clubs. On the 31st December 1932, the following numbers were under training :—

Premium apprentices	10
Free tuition	13

In addition, most of the Indian mechanics shewn above as paid staff of the clubs are still receiving training to qualify for licences as ground engineers or extensions to their licences.

The annual conference of flying club representatives was held in Delhi on the 12th February 1933, when a large number of representatives was present in connection with the Viceroy's Trophy Air Race. Matters of considerable importance were discussed and agreement reached in principle. The future support of the Aero Club of India and Burma, in view of the reduction of the Government subsidy, was decided as being of vital interest to the flying clubs and provisional measures to that end were agreed. The most important problem facing the clubs is that of making themselves self supporting. Analysis of the operational results over a period of years shews that the total costs are in the neighbourhood of Rs. 50 per hour flown, while the average income of the clubs from flying fees is approximately Rs. 25. Uniform rates of flying fees, as between the different clubs, and a general increase in flying fees were agreed on as the first step towards the reduction of the disparity. These measures have now to be given effect to by the individual clubs.

(2) *Viceroy's Trophy Air Race*.—The hope that this race would become the most important national aviation event in India and would attract attention from abroad gives promise of being well founded. The race this year was held on the 10th February 1933. There were 17 entries and 12 starters, including two Comper Swifts which had flown from England for the purpose of competing. The starting machines included :—

- 5 D. H. 60 Moth, Gipsy I.
- 2 D. H. 60 Moth, Gipsy III.
- 2 D. H. 80A Puss Moth, Gipsy III.

2 Comper Swift, Pobjoy.

1 Comper Swift, Gipsy III.

The race started and finished at Delhi, and was flown round the following course :—

	Distance. Miles.
Delhi	..
Bareilly	138
Lucknow	141
Agra	181
Rampur	128
Delhi	111
TOTAL	699

The race, a handicap speed race, was open to all pilots. Ten pilots completed the course, including one lady pilot. The other two pilots retired from the race and flew back to Delhi.

The Viceroy's Trophy was won by Captain A. I. Riley, A.F.C., the chief pilot instructor of the Delhi Flying Club, flying a Gipsy I Moth, at an average speed round the course of 115.6 m.p.h. The speed of the winner in last year's race was 96.1 m.p.h. The fastest time round the course was made by F/O G. G. Stead, flying a Comper Swift, Gipsy III engine, at an average speed of 153 m.p.h. This compares with the fastest speed of 120.5 m.p.h. made by a Puss Moth in 1931.

The Irwin Flying Fund Committee again made a contribution towards the provision of prize money.

(3) *International flights*.—No international flights were carried out by Indians. The number of casual long distance flights by foreign and non-Indian aviators across India during the year 1932 was 26. These were distributed as follows :—

British	14
French	3
German	1
American	2
Australian	2
Canadian	1
Czechoslovakian	1
Spanish	1
Swiss	1

The 14 British flights included a flight from India to England and back in an Indian registered aeroplane, by a British pilot with an Indian engineer.

There was one accident in connection with these flights, with unfortunately fatal results. This was the loss at sea near Rangoon of two British planters, Messrs. G. W. Salt and F. W. Taylor, residents of Malaya, who were flying to England. Having left Moulmein for Rangoon, they failed to arrive. Extensive searches were instituted by

the Government of Burma and the Government of India by land, sea and air but no trace of the aviators was found.

SECTION III.—ACCIDENTS.

There was a slight increase in the number of accidents to Indian aircraft during the year. In the following table, major accidents are those which involved a fatality or serious injury to personnel; minor accidents involved damage to aircraft only :—

Class of Flying.	Major.	Minor.	TOTAL.
<i>Indian Registered Aircraft.</i>			
(1) Regular Air Transport.	..	1	1
(2) Other flying for hire	..	..	..
(3) Club flying	3(2)*	12	15
(4) Private flying	..	3	3
<i>Indian Unregistered Aircraft.</i>			
Private flying	1	..	1
TOTAL (INDIAN AIRCRAFT)	4	16	20
<i>Non-Indian (British) Aircraft.</i>			
(1) Regular Air Transport.	..	..	..
(2) Private flying	1*	1	2
TOTAL (NON-INDIAN)	1	1	2
TOTAL (ACCIDENTS IN INDIA)	5	17	22

* Fatal accidents—four deaths (one presumed).

The major accidents are briefly described below :—

(1) A pilot at Lahore, while flying over the town at low altitude, stalled his machine. The machine was written off and the passenger killed. The pilot was prosecuted for a breach of the Indian Aircraft Rules with regard to low flying.

(2) At Delhi on the 14th May, a valve seat failure occurred just after the aeroplane had taken off from the aerodrome. The machine landed on rough ground and was written off. The pilot sustained minor facial injuries.

(3) On the 7th June, a machine belonging to the Bombay Flying Club, flown by a member of the Club, disappeared. No trace of pilot or machine was ever found. It is presumed that the pilot flew the machine to sea and was drowned.

(4) In October, a serious accident occurred to an old war time Avro, which was neither registered nor certified as airworthy, while flying in an Indian State; the accident was due to the breakage of the member carrying the control column bracket. The breakage occurred at a low altitude; the machine got into a spin and was completely written off

The pilot (unlicensed) suffered extensive injuries. Aircraft flying in Indian States do not come under the control of the Civil Aviation Directorate.

(5) On the 12th August, two Malay planters, flying together in an Avro Avian *en route* for England from the Malay States, left Moulmein for Rangoon. While various subsequent reports indicated that an aeroplane had been seen flying in the vicinity of the coast, the most exhaustive search by air, sea and land failed to reveal any trace of the machine or its occupants, and none of the reports were found to be sufficiently substantial to be of material assistance. The machine is assumed to have crashed during a monsoon storm in the Gulf of Martaban, and subsequently to have been carried out to sea.

An important feature of this case is that a month earlier a heavy landing had been made at Moulmein, resulting in, among other things, a damaged main spar. This spar was replaced by one made locally from a local Burmese timber called 'thitmin.' In view of the lack of data as to the strength factors of this timber, as compared with approved aircraft timber, the possibility of a structural failure having occurred during severe turbulent conditions cannot be entirely ruled out. Tests of this timber (thitmin) are being carried out.

There are four possible causes of the loss of the machine therefore—

- (1) Structural failure.
- (2) Engine failure.
- (3) Exhaustion of petrol.
- (4) Loss of control while flying low in turbulent conditions.

The evidence available is insufficient to determine which of these was the actual cause.

Dealing with the accidents generally, an attempt has been made in this year's report to analyse the classes and causes of accidents more fully. Some accidents can be clearly ascribed to one cause, but in others, while the pilot may have to bear some of the responsibility, the major portion can be ascribed to some underlying cause, such as engine failure at a critical moment or bad weather.

In Appendix VIII, the 22 accidents which occurred in India are classified according to causes, separately for each class of flying, decimals being used to indicate where the cause is divisible between two heads. Of the 20 accidents to Indian aircraft, pilots' errors were responsible for 13.5 or 68 per cent.; engine failure for 1.75; weather for 1; miscellaneous causes, such as darkness or bad ground, for .75. Of the two cases of structural failure one was an unregistered aeroplane and is dealt with above; the other, much less serious, was due to the collapse of an undercarriage on landing, due to incorrect assembly. The one undetermined case is due to the machine having disappeared, as described above.

As regards the accidents to other aircraft in India, the undetermined case is dealt with fully above.

When so large a share of the responsibility for accidents rests on the pilots, it is necessary to analyse more closely the cause. In Appendix IX this has been done in two ways. In the first part the actual cause of the accident is given. It is significant to note that the largest individual cause was stalling of the aeroplane when landing or approaching to land. There were 4 cases of this, but it may be noted that two occurred at the same high altitude aerodrome, in hot weather with variable and tricky winds. Taking together all cases of accidents connected with landing (except landing on bad ground) there were 8—out of a total of 13.5. All the accidents to pilots under training, of which there were 2.5, occurred in connection with landings.

In the second part of Appendix IX, the underlying causes of pilots' mistakes have been analysed in a simplified form of a system which has been in use throughout the past year. This allocates the underlying cause to (a) Error of judgment (b) Poor technique (c) Carelessness (d) Disobedience of Rules. In the full form of analysis, these causes are still further analysed to determine what, for example, lies behind an error of judgment. It may be simply lack of experience or lack of special experience, or it may be due to physical or psychological defects of a permanent or temporary nature. This however is too involved to deal with in detail in this Report.

Poor technique has the largest individual allocation, most of the accidents to pilots under training being ascribed to this cause. Among licensed pilots, poor technique and error of judgment were responsible for an equal proportion.

In Appendix X the major accidents in Indian Aviation and casualties are compared with the hours and miles flown. Nearly half a million miles were flown for each fatality.

SECTION IV.—MISCELLANEOUS FLYING AND COMMERCIAL ACTIVITIES.

(1) *H. E. The Viceroy's Tours.*—H. E. The Viceroy's Avro 10 aeroplane was operated throughout the year by the Royal Air Force and was used for the following tours:—

Date.	Tour.	Distance.
		Miles.
2nd January 1932	Calcutta to Delhi	725
20th March 1932	Delhi to Ambala and back	240
16th April 1932	North West Frontier and Baluchistan	720 approx.
28th April 1932		
11th July 1932	Allahabad to Calcutta	461
24th July 1932	Calcutta to Allahabad	461
14th October 1932	Delhi—Jodhpur—Ahmedabad—Poona	854
17th October 1932	Poona—Ahmedabad—Jodhpur—Delhi	854
4th October 1932	Delhi to Ambala and back	240
6th October 1932		

(2) *De Havilland Aircraft Co., Ltd.*—The Indian sales and service branch is still maintained by this firm at Karachi. Partly on account of financial stringency, the flying clubs replaced some of their aircraft by second hand equipment, and the sales of new aircraft by the De Havilland Aircraft Co. shewed a marked reduction. During 1932-33 the sales were as follows:—

	Value. Rs.
2—120 H. P. Gipsy III Wooden Moths	77,300
1—120 H. P. Gipsy III Puss Moth	
2—130 H. P. Gipsy Major Fox Moths	
1—120 H. P. Gipsy III engine	

The value of sales during 1931-32 was Rs. 1,71,350. At the same time five fuselages and airframes, without engines were sold, and one machine was completely built from components in India. The repair and overhaul work of the firm made satisfactory progress, major repair contracts being completed on seven D. H. Moths and one D. H. Puss Moth.

(3) *Imports of aircraft and aircraft material.*—The total value of the imports of aircraft and aircraft material into India during the year 1932 was Rs. 3,19,064.

(4) *Air Survey and Photography.*—The only company carrying out this work in India is Indian Air Survey and Transport Ltd., of Dum Dum.

During the year 1932 work was continued on the programme of settlement mapping in the United Provinces and Bengal. The total area photographed during the year 1932 was 877.5 square miles, compared with 2,712 square miles in 1931, but a considerable area of mapping work in addition was completed during the year. The flying carried out by the company during the year amounted to 181½ hours.

Maps on a scale of 16" to the mile showing the boundaries of every field holding in an area of 1,500 square miles were delivered to the Government of the United Provinces. Photographs of an area of 850 square miles on the same scale, rectified for tilt and mounted on zinc sheets to avoid distortion, were delivered to the Government of Bengal preparatory to the preparation of settlement maps. The photography of another block of 750 square miles in the Rangpur district, Bengal, was completed in December. A survey of 30 square miles in the Dacca district was completed in April in connection with the planning of protection works along the Sityalakhia Khal at Narainganj. Towards the end of the year a number of tests were made to determine the suitability of Infra Red photography for high altitude work in India. An example of this work, taken over Calcutta, is published in this Report.

(5) *Indian States.*—Apart from developments in Jodhpur, referred to under the heading of the Jodhpur Flying Club, there is a marked indication that flying is being taken up by the Indian States, both by the Ruling Princes themselves and for the general purposes of the State

and private flying. The purchase of an aeroplane by H. H. the Nawab of Junagadh was referred to in last year's report.

H. H. the Maharajah of Patiala, who has long been interested in flying, has purchased a Monospar and engaged a pilot and further aviation developments are contemplated in the State.

The Alwar State purchased a Puss Moth and engaged an Indian pilot to improve communications within the State during the unrest which prevailed early in 1933.

H. E. H. the Nizam's Government, early in 1933, appointed a Civil Aviation Board, and steps were taken to select and acquire land for a civil aerodrome at the capital and to form a flying club which will commence operations during 1933. A programme for the development of commercial aviation within the State is being worked out.

SECTION V.—ADMINISTRATION.

(1) *Civil Aviation Budget.*—The provision made for civil aviation in the budget for the year 1932-33 was Rs. 8,94,000. This figure was made up as shewn in the following table, which also shews the revised figures after readjustments had been made in the course of the year:—

	Budget.	Revised.
(1) Direction and staff	2,40,400	2,25,200
(2) Works	1,38,100	2,17,100
(3) Grants to clubs	1,30,000	1,12,700
(4) Wireless services	3,20,000	3,20,000
* (5) Other grants for aviation purposes	47,000	43,200
(6) Expenditure in England, on leave salaries, scholarships, recruitment, etc.	18,500	35,000
	8,94,000	9,53,900

The main change from the Budget figures is due to the carry over of a large volume of work on the preparation of the Bombay (Juhu) aerodrome, provision for which was not made in the budget.

The final figure accepted in the Civil Aviation Budget for 1933-34 stands at 10,03,000 made up as follows:—

(1) Direction and staff	2,81,400
(2) Works	1,66,400
(3) Grants to clubs	1,32,000
(4) Wireless services	3,50,000
* (5) Other grants for aviation purposes	41,200
(6) Expenditure in England on leave salaries, scholarships, etc.	32,000
	10,03,000

* Item 5, "Other Grants" consists mainly of a special fund derived from the Road Fund tax on petrol used in aviation, the proceeds of which are devoted to experimental work and training.

The increases under the heads "Works" and "Wireless Services" represent in part provision for new works and expanding services. They are dealt with in more detail under Ground Organisation.

(2) *Petrol Tax Fund*.—A sum of Rs. 42,000 was available in this fund in 1932-33. The fund is earmarked for experimental research and training purposes. Funds were allotted to the following objects:—

(1) Night lighting of aerodromes: purchase of flood lights.

(2) Experimental runway on Delhi aerodrome.

(3) Training of a pilot instructor.

(3) *Helium Research*.—The samples of natural gas collected during the preceding year from oilfields in India and Burma are still under analysis by the Indian Institute of Science, Bangalore.

(4) *International Conventions*.—India was represented at the 20th Session of the International Commission for Air Navigation in Paris by Mr. A. Dibdin of the India Office. A number of the complex questions which come before this Commission have been examined. Among these, one of the more important is a new examination of the right of reservation of cabotage.

A Convention respecting Air Transport Services has been negotiated between Great Britain and Italy and was finally ratified on the 30th December 1932 on behalf of India as well as Great Britain. The Convention defines the conditions on which the regular air services of the contracting parties may operate over each other's territory. So far as India is concerned it permits the operation of an Italian service to and from or through Aden.

In this connection, it may be noted that although Great Britain, India and Italy are all parties to the International Convention for the Regulation of Air Navigation, which permits the aircraft of one contracting State to fly over the territory of another contracting State, the Convention itself stipulates that the operation of regular air lines shall be subject to the prior consent of the State flown over.

The International Convention for the Sanitary Control of Air Navigation has now reached its final form and is in process of examination and investigation to enable a decision to be reached with regard to the adhesion of India.

The Convention with regard to the liability of air carriers, a Convention, as to liability for damage caused by aircraft to third parties on the ground and a Convention regarding the cautionary arrest of aircraft, all three drawn up by the Comité Internationale Technique D'Experts Juridiques Aériens, have formed the subject of examination.

(5) *Indian Aircraft Act and Rules*.—While progress was made in drafting, it was not possible to present the new Indian Aircraft Bill to the Assembly during 1932.

A considerable portion of the Indian Aircraft Rules was revised, and a revised edition of the Rules placed on sale. The amendments were effected in two Notifications:

(1) Notification No. T-51, dated the 5th April 1932.

This Notification dealt with (1) the registration and marking of aircraft: bringing the law on the subject into line with the International Convention for Air Navigation; (2) log books: making it compulsory to maintain aircraft and engine log books and, for aircraft in certain conditions, journey log books; (3) customs: *inter alia* providing for the proper payment of duty on aircraft imported by air.

(2) Notification No. T-51, dated the 9th June 1932.

This Notification revised the whole of the Rules with regard to the licensing of aircraft personnel. The rules were brought into line with the requirements of the International Convention for Air Navigation and certain provisions peculiar to India were introduced:

(i) The conditions for obtaining a pilot's "A" licence were made more severe, the required number of hours solo flying being raised from 3 to 5.

(ii) A limited commercial pilot's licence (A 1) for the carrying of passengers in the neighbourhood of aerodromes in India was introduced. This is obtainable after 100 hours solo flying and with less onerous examinations than are required for the B licence.

(iii) The conditions of issue of the full commercial pilot's licence (B licence) were also stiffened. It is now only obtainable after 200 hours solo flying and at least 5 hours night flying.

(iv) A pilot instructor's licence was introduced, which is only obtainable after 500 hours flying experience has been gained and after practical and oral examinations have been passed.

(v) Provision was made for the issue of navigator's and wireless operator's licences.

(6) *Air Navigation in Indian States*.—The Summary of Principles adopted by the Chamber of Princes and referred to in the Annual Report for 1930-31 was made effective by the issue of a Resolution by the Government of India.

(7) *Prosecutions under the Indian Aircraft Act*.—There was one prosecution under the Indian Aircraft Act during the year. The pilot, a member of the Punjab Flying Club, is alleged to have carried out low and dangerous flying over the inhabited area of Lahore, which resulted in the crash of the machine and the death of his passenger. The pilot was sentenced to a fine of Rs. 200 or, in default, 7 days' rigorous imprisonment.

(8) *Licences and Certificates*.—A statement shewing the number of licences and certificates issued during 1932 and comparative figures for 1931 is given in Appendix XI.

(9) *Notices to Airmen*.—42 Notices to Airmen were issued during the year as compared with 25 during 1931 and 10 during 1930.

(10) *New appointments*.—Mr. N. Vincent, D.F.C., resigned in order to take up the post of Manager of the Aviation Department of Tata Sons, Ltd., and was replaced by Mr. A. T. E. Eadon, M.I.Ae. E., as Deputy Director of Civil Aviation in July 1932. Mr. J. M. Randall was appointed Assistant Aircraft Inspector in May 1932.

(11) *Aerodrome control*.—Extended arrangements were made for the performance of certain duties in connection with air traffic at the landing grounds in Burma, by local civil officers. The administrative control of the aerodrome at Bombay was entrusted to the Bombay Flying Club. At Akyab, a whole-time official of the Civil Aviation Directorate was appointed to relieve the Executive Engineer, Akyab.

(12) *Civil Aviation Scholarships*.—During the year 1932-33, only two students remained in England for training as assistant aircraft inspectors. These students will complete their course of training in September 1933.

SECTION VI.—AIRCRAFT INSPECTION.

The maintenance of the airworthiness of aircraft is one of the most important functions in the administration of civil aviation. It is a problem fraught with much difficulty, even in a compact and well organised industrial country, and these difficulties are greatly increased in a country of the dimensions of India, having no aircraft manufacturing organisation.

The question has been much debated in all countries whether Government control of the airworthiness of aircraft is a justifiable measure. It is pointed out, on the one hand, that no control is generally imposed on the design or mechanical efficiency of motor cars, and on the other, that in all well regulated countries, the seaworthiness of ships is a matter of concern to the State. To a large extent, the seaworthiness of ships is guaranteed by inspection established by insurance organisations, whose standards have become a household word. Whatever may be the ultimate development, it appeared to those charged with the consideration of this problem in international discussions that the supervision of airworthiness was a necessity. The serious result of the structural failure of an aircraft both to the occupants and to persons and property on the ground appeared an adequate reason for meting out different treatment from that accorded to motor cars.

The International Convention for the Regulation of Aerial Navigation, to which India is a party, prescribes that every aircraft engaged in international navigation shall be provided with a certificate of airworthiness issued by the State in which the aircraft is registered. Most contracting States have applied the same condition to all aircraft, while other non-contracting States have, in a greater or lesser measure, followed suit. While there has been criticism in detail and criticism of

the application of control to private aircraft, it is generally accorded that the system of airworthiness investigation and control has been in the interest, not only of the public, but of the sound development of civil aviation.

In India, compulsory certification of airworthiness is applied only to aircraft employed for commercial purposes and those undertaking international flights. Private aircraft is, in this respect, left unfettered. This policy has been followed and is being continued, partly on account of the undeveloped inspection organisation and partly as an experiment—in other words, to allow experience to dictate the necessity. Many private owners apply voluntarily for airworthiness inspection and thereby come under the same system of supervision as is applied to commercial aircraft. A strong incentive to do this is supplied by the requirement that any aircraft engaged in international navigation must be supplied with a certificate of airworthiness. Without it no Indian aircraft could fly abroad.

In a country like India, with no manufacturing organisation, a problem of no small difficulty is encountered in the settlement of the standard of airworthiness. To establish an independent standard or to verify independently an adopted standard would be impossible without a large technical organisation such as exists in the Air Ministry Airworthiness Department or the Aeronautics Branch of the American Department of Commerce. Nor is it necessary, while aircraft are not designed and manufactured in India, to set up such an organisation. The absence of it, however, makes it necessary to adopt the standard of another country and to rely on the organisation of that country. Fortunately this has been possible by adopting the British standard, and the greatest help has been, at all times, received from the Air Ministry. Indian certificates of airworthiness are issued for all aircraft which have satisfied the British airworthiness requirements.

In adopting the Air Ministry standard, it follows that other standards which have not been proved to be the equivalent of that standard cannot be accepted. The standards worked to by certain other countries are known to be sound, but to differ from the Air Ministry standard. It requires special expert staff to determine the differences and the modifications in design necessitated thereby. Such a task could not be attempted in India and it is, therefore, necessary that any foreign built aircraft, to obtain a certificate of airworthiness in India, must first be accepted for the issue of a certificate of airworthiness by the Air Ministry.

Determined efforts are being made in international negotiations to obtain, as far as possible, a unification of standards of airworthiness. The International Commission for Air Navigation have, for some years, been engaged in the formulation of an international minimum standard. In the meantime, however, negotiations and investigations, which were launched at the Imperial Conference in 1930, are proceeding towards the adoption of an Empire standard of airworthiness, common to all countries in the British Empire. Its adoption will go a long way to

ease the situation in India, since aircraft manufactured in any country of the Empire, and exported with a certificate of airworthiness may then be accepted as complying with the Indian adopted standard. The remainder of the problem is one of maintenance which is within the scope of the Indian organisation.

Negotiations are also proceeding with the United States of America to settle the conditions of mutual recognition of American and British certificates of airworthiness. The settlement of these terms will make it possible to import American built aircraft for commercial work in India. Pending agreement and the determination of the conditions, foreign built aircraft can only be used in India for private flying, on which there is no restriction. In the case of any particular aircraft, however, it may happen that the type has already been accepted for airworthiness purposes by the British Air Ministry or an Indian certificate of airworthiness may be obtained by first submitting the aircraft to investigation by the Air Ministry and obtaining a British certificate of Airworthiness.

During the year 1932-33, 24 applications were received for issue or renewal of Certificate of Airworthiness for public transport aircraft and 19 for issue or renewal of Certificates of Airworthiness for private aircraft. The number of applications relating to private aircraft represents a considerable increase over previous years. This is satisfactory as indicating that private owners appreciate the value of inspection and proper maintenance of their aircraft, as the principle factor in ensuring safety and obviating accidents from engine failure or structural failure of the aircraft.

In order to augment inspection facilities in India an investigation is being made of the possibility of using certain senior Ground Engineers having considerable experience, for purposes of actual inspection of private aircraft for renewal of Certificates of Airworthiness; partly with this in mind, it is the practice to require that all aircraft submitted for Government inspection, should have been previously examined and passed by a licensed Ground Engineer.

(1) *Gluing and Welding*.—Considerable improvement in gluing technique has been effected by rigorous tests of Ground Engineers. Results 50 per cent. above the specification requirements were in many cases obtained. 65 per cent. of the Ground Engineers licensed in Category 'A' and/or 'B' have now qualified in gluing and the remainder are being tested. In view of the importance of the process in aircraft repairs, it has been decided to make the passing of glue tests compulsory for the holders of licences in categories 'A' and 'B'.

Seven batches of test pieces for welding were received during the year, but none were up to standard. There are in India at present no approved welding facilities. In view of the growing number of metal aircraft in India, the matter is of considerable importance.

(2) *Timber Tests*.—During the year, with the co-operation of the Indian Forest Research Institute, deterioration tests have been carried

out on certain aircraft materials, and further tests of the deterioration of timber, glue and other materials are proposed. The results of these when available, should be of value to aircraft manufacturers producing aircraft for operation in tropical conditions, as well as to prospective purchasers of aircraft who will be enabled to specify methods of construction known to be not unsuitable for operation in tropical conditions.

(3) *Investigation of defects*.—All defective material and defective parts are brought under examination, as a result of which typical defects are identified. Those investigated have all related to engine failures. Amongst these may be mentioned failures of valve seats, cylinder head valve rocker bracket, crankcases and connecting rods. Each type of defect has been given very full investigation. As a result, either improved material, design or manufacturing methods have been introduced.

(4) *Approved Firms*.—The approved distribution procedure has been developed and extended. The following firms were approved up to the end of 1932 as distributors of aircraft parts, materials, etc. :—

Name of Firm.	Purpose for which approved.
1. De Havilland Aircraft Co., Ltd., Karachi.	Supply of aircraft components and materials.
2. Indian Air Survey and Transport, Ltd., Dum Dum.	Ditto.
3. Messrs. Hoosenbhoy Karimji & Sons, 170, Napier Road, Karachi.	Supply of aeronautical publications.
4. A. R. Haseler, Bombay.	Supply of aircraft components and materials.
5. French Motor Car Co., Ltd., Calcutta.	Supply of aircraft instruments.
6. The Dunlop Rubber Co., India, Ltd., Calcutta, Bombay and Madras Branches.	Supply of aircraft tyres and tubes.
7. Geo. Miller & Co., Ltd., Engineers and Agents, 7, Hastings Street, Calcutta.	Supply of aircraft glue.
8. Martin & Co., Department Bosch Service, 58, Free School Street, Calcutta.	Supply of aircraft magneto spares and for repair and overhaul of aircraft magnetos and magneto parts.
9. Messrs. Lucas Indian Service, Ltd., 2, New Queens Road, Bombay.	To fit maker's approved aircraft magneto spares. (Except rewinding of armatures.)

SECTION VII.—GROUND ORGANISATION.

(1) *Budget*.—The sum of Rs. 1,38,100 provided for works services in the Budget for 1931-32 was allocated as follows :—

	Rs.
1. Bombay (Juhu) aerodrome, preparation	30,000
2. Maintenance and repairs	80,000
3. Departmental charges	28,100
	1,38,100

This grant was, however, increased during the year to Rs. 2,11,626 by reappropriations from within the grant for Civil Aviation and by a supplementary grant mainly on account of the carry over of work on the Juhu aerodrome from the previous year. The final allocation was as under :—

	Rs.
1. Bombay aerodrome, preparation.	1,10,100
2. Minor works	1,526
3. Aerodrome equipment	5,000
4. Maintenance and repairs	59,376
5. Departmental charges	36,100
	2,12,102

(2) *Bombay (Juhu) aerodrome.*—Filling work on the landing area was completed before the monsoon of 1933. The area had to be restricted to smaller dimensions than had been originally contemplated by leaving unmade, the North-West corner of the site. The landing ground, as completed, provides a run of 800 yards in the North-South direction and 800 yards in the East-West direction, while the east-west arm on the northern side is 266 yards and the north-south arm on the western side is 300 yards in width. The construction of certain other essential works, viz., chowkidar's hut, store, compass swinging base, garage, laying electric cables, etc., was completed before the end of the financial year.

The total cost of the aerodrome is approximately Rs. 7,98,372 made up as follows :—

	Rs.
Acquisition	3,08,244
Preparation	4,66,698
Buildings, roads, electric mains, water supply	23,430
TOTAL	7,98,372

A hangar of 61 feet span has been erected by Messrs. Tata Sons, Ltd., for the air mail service, in the building area adjoining the Bundra-Godbunder road on the east side of the aerodrome. The hangar has been connected with the water, light and telephone mains. Bulk storage of petrol has been provided in the vicinity of the hangar by arrangement with the Burmah Shell Co.

Applications for other building sites in this area have been invited.

(3) *Minor Works.*—The following minor works were completed during the year :—

Dum Dum. Construction of a room in the verandah of the hangar, as an office for the Assistant Aircraft Inspector.

Akyab. Conversion of a store room into aerodrome office.

(4) *Aerodrome lighting.*—Two 5 K. W. mobile flood-lights, mounted on trailers with self-contained generating plants, have been purchased and delivered to the Karachi Air Port. These flood-lights are primarily intended for flood-lighting the landing area for night landings, but they are also equipped with automatic rotating gear for use as beacons. For this purpose the lantern is tilted up to any angle up to 35° from the horizontal, in which position a fan shaped beam of light is swept round the sky. It is expected that, in the climatic conditions of India, these rotating beacons will normally be visible at a range of well over 30 miles. When the aeroplane reaches the landing ground the rotating mechanism is stopped and the flood-light, located on the leeward side of the landing ground, is depressed to illuminate the ground. The beam from the flood-light, while concentrated into a narrow beam vertically has a lateral spread of 180°. The aeroplane lands parallel to the centre of the beam and to one side of the flood-light, to avoid its own shadow.

Flood-light operators are undergoing training at the Karachi Air Port. Thereafter the flood-lights will be located at aerodromes on the air mail route, where late arrivals and early starts are made.

The flood-lights have been purchased from the special fund for experimental lighting and other purposes derived from the two-anna road tax on petrol used in aviation.

(5) *Indian States.*—Many new landing grounds have been constructed in Indian States territory by the Darbars.

In Jodhpur alone more than a dozen new landing grounds have been made, all marked and provided with wind indicators. Two of these are on the main trans-India route, while at the main aerodrome at Jodhpur a new hangar of 90-foot span has been constructed, a first class hotel has been built and many improvements effected.

In the Kathiawar States nine new landing grounds have been completed, while others have been made in Patiala and the States in the eastern Punjab.

(6) *Wireless Services.*—No great changes have taken place in the aeronautical wireless service since the last Annual Report. The Gaya W/T and D. F. station and the Delhi and Allahabad D. F. stations have remained closed. The existing "Spark" wireless station at Victoria Point (Lower Burma) has been modernised by installing a continuous-wave transmitter and a direction-finding installation. Direction-finding installations have been completed at Chittagong, Sandoway and Bassein.

Communication has been established between Rangoon and the wireless station at Laksi (Siam) and through Victoria Point with the wireless station at Penang in the Straits Settlements. Along the Mekran Coast, west of Karachi, messages are exchanged with the wireless station at Gwadar, which is controlled by Imperial Airways Ltd. The arrange-

ments for reporting the arrival and departure of aircraft along the whole trans-India route are now therefore more or less complete.

Pending the establishment of additional wireless stations between Rangoon and Victoria Point, arrangements have been made for reporting the progress of aircraft landing at aerodromes in this sector by land line.

It is also proposed, during 1933-34 to fit the air mail machines on the Karachi-Madras service with wireless telephony apparatus and to carry out experimental communication with Karachi, Bombay (Santa Cruz) and Madras (St. Thomas' Mount).

A schedule of aeronautical wireless stations in India and Burma and communicating stations in neighbouring countries will be found in Appendices XII and XIII.

Proposals are also under consideration for the erection of an aeronautical wireless station at Tavoy (Lower Burma) and it is hoped that funds will be available during the financial year 1933-34 for the completion of this station.

Arrangements have been made for the regular interchange of meteorological information between the wireless stations on the air route across India and Burma between Karachi and Victoria Point.

(7) *Meteorological Services*.—No changes have been made in the main organisation of this service. Considerable development has however taken place in the co-ordination of the meteorological and wireless services and the aerodrome organisation, resulting in weather reports and forecasts being more readily available to pilots on the ground and in flight.

Observations of present weather are regularly made twice a day in the early morning and about noon by the meteorological observers along the trans-India route. These are transmitted to neighbouring meteorological offices and aerodromes by wireless telegraphy. Special observations are made on request and transmitted by wireless to other ground stations and to aircraft in flight. Details of this arrangement are given in Notice to Airmen No. 18 of 1932 and in Pamphlets which may be obtained from the Meteorological Officers at Poona, Calcutta and Karachi.

Meteorological forecasts are not made and issued at routine times, it being found more effective in the present state of development of air services in India to make special forecasts when required. The forecasting centres on the trans-India route are at Karachi and Calcutta, and forecasts are transmitted by wireless from these stations to other aerodromes and to aircraft in flight on request. The arrangements in this connection are set out in Notice to Airmen No. 21 of 1932 and in pamphlets which may be obtained from the Meteorological Officers at Poona, Calcutta and Karachi.

Arrangements were made on the transfer of the Persian Gulf air route to the Arabian Coast on 1st October, for the supply of weather

forecasts and reports for this route, by wireless to various stations on the route and to aircraft in flight.

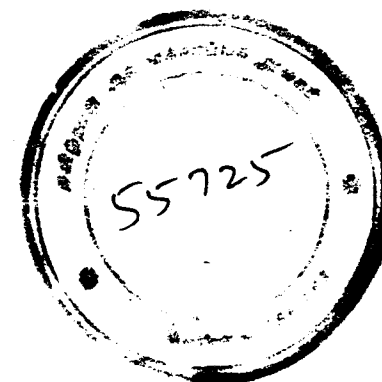
Arrangements have also been made for the preparation and supply of weather forecasts for the Karachi-Bombay-Madras Air Mail Service. Forecasts for the Karachi-Ahmedabad section are supplied from Karachi, and forecasts for the Ahmedabad-Madras section from Poona.

A further improvement in the meteorological organisation on the Karachi-Madras air route will be effected during 1933-34, when new upper wind stations will be established at Juhu aerodrome and at several places in the neighbourhood of the Western Ghats. While financial conditions do not permit of the organisation of the meteorological service on this route, even to the standard existing on the trans-India route, these additional observation stations will contribute materially to the safety of the mail service over this difficult sector of the route.

(8) *Air-Pilot—India and Burma*.—An "Air Pilot" giving full details of all ground organisation and services for civil aviation in India has been printed and placed on sale. The publication is available for sale in England and India. Copies can be obtained in England from the High Commissioner for India and in India from the Manager of Publications, 8, Hastings Street, Calcutta.

(9) *Aeronautical maps*.—The preparation of "International local Aeronautical Maps" on a scale of 1/1,000,000 in accordance with the revised Annex. F of the International Convention for the Regulation of Air Navigation is in hand. The following sheets are now being produced by the Director of Map Publication :—

N. H. 43 . . .	Punjab, Punjab States, Rajputana, U. P.
N. G. 43 . . .	Punjab, Punjab States, U. P., Rajputana, Ajmer-Merwara, Gwalior, Bombay, Western India States and Baroda.
N. G. 44 . . .	U. P., C. P., C. I., B. & O., Rajputana, Gwalior, Nepal.



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APPENDIX I.
Karachi-Bombay-Madras Air Mail Service.
 (Commenced 15th October 1932).

Period.	AIRCRAFT FLIGHTS.			Aircraft Mileage.	PASSENGERS.		Freight.	MAILS.	
	Scheduled.	Completed.	Percentage Regularity.		Actual.	By stages.		South- bound.	North- bound.
October	6	6	Per cent. 100	7,920	..	..	lbs. ..	lbs. 378	lbs. 423
November	8	8	100	14,580	1	2	38	476	497
December	9	9	100	13,220	..	..	15	610	590
TOTAL	23	23	100	35,720	1	2	53	1,464	1,510

APPENDIX II.

Delhi-Karachi Air Mail Service.

Period.	AIRCRAFT FLIGHTS.			PASSENGERS.		Freight.	MAILS.		REMARKS.
	Scheduled.	Completed.	Percentage Regularity.	Aircraft mileage.	Actual.	By stages.	West-bound.	East-bound.	
1932, March Quarter .	26	26	100	17,940	2	2	lbs. 1,157	lbs. 1,283	
" June Quarter .	26	24	92	17,940	2	3	1,004	1,399	One engine failure; One weather.
" September Quarter.	26	25	96	17,940	1	2	1,080	1,464	One weather.
" December Quarter.	26	26	100	17,940	1	1	1,489	1,190	
TOTAL .	104	101	97	71,760	6	8	4,730	5,336	

NOTE.—Flights on which the air mail connection at Karachi was missed are shown as uncompleted; in each case the flight was completed later. Mails carried on these flights are not included.

APPENDIX III.

Regular Air Services. Karachi Air Port.

Services and Period.	EASTBOUND-ARRIVALS.					WESTBOUND-DEPARTURES.				
	Scheduled flights.	Punctual.	Delay.			Scheduled flights.	Punctual.	Delay.		Cancelled.
			1 day.	2 days.	3 days or more.			1 day.	2 days.	3 days or more.
1931.—1st Quarter. Imperial Airways .	13	11	2	..	..	12	9	3	..	..
K. L. M. . .	..	..	..	..	..	..	..	..	..	..
Air Orient . .	..	..	..	..	..	..	..	..	..	..
1931.—2nd Quarter. Imperial Airways .	13	8	2	2	1	14	14	..	..	..
K. L. M. . .	7	6	1	..	..	7	6	1	..	..
Air Orient . .	5	3	1	1	..	4	4	..	..	..
1931.—3rd Quarter. Imperial Airways .	13	11	2	..	..	13	10	1	2	..
K. L. M. . .	6	6	..	..	..	6	2	3	..	1
Air Orient . .	7	5	1	1	..	7	7	..	..	..

APPENDIX III—contd.

Regular Air Services. Karachi Air Port—contd.

Services and Period.	EASTBOUND-ARRIVALS.						WESTBOUND-DEPARTURES.					
	Scheduled flights.	Punctual.	Delay.			Cancelled.	Scheduled flights.	Punctual.	Delay.			Cancelled.
			1 day.	2 days.	3 days or more.				1 day.	2 days.	3 days or more.	
1931.—4th Quarter.												
Imperial Airways . .	13	5	2	4	2	..	14	10	2	1	1	..
K. L. M. . .	13	4	4	2	3	..	11	10	1	..	..	..
Air Orient . .	6	5	1	..	..	..	6	2	3	1	..	..
1932.—1st Quarter.												
Imperial Airways . .	13	7	2	2	2	..	13	13	..	..	..	..
K. L. M. . .	13	2	9	2	..	..	13	11	2	..	..	..
Air Orient . .	7	6	1	..	..	..	7	7	..	..	..	..

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1932.—2nd Quarter.									
Imperial Airways . .	13	10	1	2	..	13	13	..	..
K. L. M. . .	13	10	2	1	..	13	11	2	..
Air Orient . .	10	6	4	..	..	10	7	1	..
1932.—3rd Quarter.									
Imperial Airways . .	14	14	..	..	..	13	11	1	1
K. L. M. . .	13	11	1	1	..	13	12	1	..
Air Orient . .	13	10	1	2	..	13	7	4	1
1932.—4th Quarter.									
Imperial Airways . .	13	6	3	3	2	13	13	..	..
K. L. M. . .	13	9	1	2	1	13	9	2	2
Air Orient . .	13	11	1	1	..	13	10	3	..

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APPENDIX IV.

Regular Air Services to India 1932.

AIR MAILS TO INDIA.

	IMPERIAL AIRWAYS.		K. L. M.		AIR ORIENT.		TOTAL.
	Ordinary mails.	Transit mails.	From Europe.	From the East.	From Europe.	From the East.	
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
1929, 9 months	21,967	16	..	..	..	..	21,983
1930	39,364	359	96	..	..	..	39,819
1931	45,632	840	1,047	No record.	318	No record.	47,837
1932, March quarter	10,376	259	657	211	66	2	11,571
1932, June quarter	9,835	338	684	282	120	12	11,271
1932, September quarter	11,701	501	835	329	121	23	13,511
1932, December quarter	13,199	668	1,040	544	151	42	15,643
TOTAL 1932	45,111	1,766	3,216	1,366	458	79	51,986

AIR MAILS FROM INDIA.

	IMPERIAL AIRWAYS.		K. L. M.	AIR ORIENT.		TOTAL.
	Ordinary mails.	Transit mails.		To the East.	To the East.	
	lbs.	lbs.		lbs.	lbs.	
1929, 9 months	20,171	485	..	..	..	20,656
1930	34,015	2,561	..	..	..	36,576
1931	40,474	2,592	..	..	..	43,066
1932, March quarter	9,869	907	..	..	..	10,776
1932, June quarter	9,891	990	..	..	..	10,881
1932, September quarter	10,863	1,076	..	..	..	11,939
1932, December quarter	11,784	1,326	117	14	14	13,241
TOTAL	42,407	4,299	117	14	14	46,837

APPENDIX V.

Traffic return of regular air services to and from India (Karachi) excluding Air Mails.

	No. of flights.	PASSENGERS.		FREIGHT (INCLUDING BULLION).	
		To India.	From India.	To India.	From India.
<i>Imperial Airways.</i>					
1929, 9 months	80	No record.	No record.	No record.	No record.
1930	105	78*	70*	No record.	No record.
1931	104	80†	74†	5,489	313
1932, March quarter	26	43	33	1,228	204
1932, June quarter	26	19	46	1,178	2
1932, September quarter	27	43	37	1,461	28
1932, December quarter	26	45	26	1,206	32
* TOTAL	105	150	142	5,073	266

Foreign Services.

1931	106	32†	18†	628†	43‡
1932, March quarter	40	—§	—§	136	1,150
1932, June quarter	46	9	13	106	88
1932, September quarter	52	2	8	425	342
1932, December quarter	52	5	9 ¶	564	1,106
TOTAL	190	16	30 ¶	1,231	2,686

* Figures for the financial year 1930-31.

† No figures for the first quarter; figures relate to the last nine months.

‡ No figures for the first half year.

§ Not known.

Traffic return of regular air services to and from India (Rangoon) excluding Air Mails.

	No. of flights.	PASSENGERS.		FREIGHT.	
		To India.	From India.	To India.	From India.
<i>Foreign Services.</i>					
1932, March quarter	38	1	8	..	..
1932, June quarter	46	12	5	115	..
1932, September quarter	52	8	2	1	5
1932, December quarter	54	20	13	12	1,346
TOTAL	190	41	28	128	1,351

APPENDIX VI.

Indian Air Ports.

	AIRCRAFT.		IMPORTS BY AIR.		EXPORTS BY AIR.	
	Arrivals from foreign.	Departures for foreign.	Merchandise.	Bullion and currency notes.	Merchandise.	Bullion and currency notes.
<i>Karachi.</i>			Rs.	Rs.	Rs.	Rs.
1931, March quarter	28	22	1,50,601	1,06,801	4,286	10,00,000
1931, June quarter	31	32				
1931, September quarter	27	25				
1931, December quarter	36	32				
TOTAL	122	111	1,50,601	1,06,801	4,286	10,00,000
1932, March quarter	43	36	54,734	..	8,277	2,00,000
1932, June quarter	43	41	32,345	..	2,125	..
1932, September quarter	45	40	1,72,435	..	2,884	..
1932, December quarter	43	44	1,49,742	33,766	1,842	..
TOTAL	174	161	4,09,256	33,766	15,128	2,00,000

	10	15	Nil		Nil	Nil	4,54,790
1931, March quarter	10	15	Nil		Nil	Nil	4,54,790
1931, June quarter	14	16	Nil		Nil	Nil	8,57,180
1931, September quarter	15	14	Nil		Nil	Nil	1,15,446
1931, December quarter	18	20	Nil		Nil	Nil	2,10,521
TOTAL	57	65	Nil		Nil	Nil	10,75,416
1932, March quarter	19	22	48		48	225	22,58,563
1932, June quarter	23	28	220		220	225	22,58,563
1932, September quarter	26	28	366		366	225	22,58,563
1932, December quarter	28	29	1,174		1,174	225	22,58,563
TOTAL	96	107	1,808		1,808	225	22,58,563
<i>Bombay.</i>							
1932, March quarter	..	..	..		..	..	..
1932, June quarter	..	..	..		..	..	..
1932, September quarter	..	..	4,17,160*		4,17,160*	..	..
1932, December quarter	1	..	563		563	..	..
TOTAL	1	..	4,17,722		4,17,722	..	..
<i>Calcutta.†</i>							
August to December 1932	36	Not available	4,637‡		4,637‡	Not available	Not available.

* Diamonds.
† Goods landed by aircraft at Karachi, but assessed for duty at Calcutta, Rs. 1,223.
‡ November and December.

APPENDIX VII.

Summary of the work of the Flying Clubs during the year 1932.

Flying Clubs.	NUMBER OF MEMBERS.			AIRCRAFT.		AB INITIO PILOTS QUALIFIED FOR "A" LICENCE.		NUMBER OF HOURS FLOWN.		
	Total.	Flying Members.		Number.	Type.	European.	Indian.	Instruc- tion hours.	Other flying hours.	Total.
		European.	Indian.							
Delhi	226	45	60	4	D. H. Moth Gipsy I	5	9	594	1,072	1,666
Cawnpore	102	12	9	1	D. H. Moth Gipsy II	2	1	152	295	447
Lucknow	94	11	23	1	Bluebird-Gipsy I	..	3	223	356	579
Bombay	264	44*	78*	4	D. H. Moth Gipsy I	7	12	853	1,434	2,287
Madras	267	22	8	3	2 D. H. Moth Gipsy I	9	3	465	806	1,271
Bengal	323†	79†	47†	4	1 D. H. Puss Moth Gipsy III	12	9	525	1,142	1,667
Karachi	144	28	61	3	D. H. Moth Gipsy I	6	6	324	580	904
Kathiavar	118	Not available.		3	1 D. H. Moth Gipsy III	..	1	95†	164†	259†
Jodhpur	..	..		2	1 Bluebird Gipsy II	..	..	..	339	339
Punjab	..	..		1	D. H. Moth Gipsy I	..	..	..	160§	298§
TOTAL	1,538	241	287	26	TOTAL	41	44	3,369	6,343	9,717

* Figures for the month of January 1932.

† Figures for the month of November 1932.

‡ Figures for the period July-December 1932.

§ Figures for the period January-April 1932.

APPENDIX VIII.

Accidents in India.

ANALYSIS OF CAUSES.

Type of flying.	Pilot.		Engine.	Structure.	Weather.	Miscella- neous.	Undeter- mined.	Total.
	Licensed.	Under training.						
<i>Indian aircraft.</i>								
Club Flying—								
Bombay	3	..	..75	..	..	..	1	4
Delhi	25	..	5	..	..	..	..	1
Cawnpore	5	1	..	..	..	..	..	1
Lucknow	15	..	5	..	..	..	..	1
Karachi	1	1	..	..	..	..	..	2
Punjab	1	5	..	..	..	..5	..	2
Jodhpur	1	..	..	1	..	..	..	2
Kathiawar								2
TOTAL CLUBS	8.25	2.5	1.75	1	..	5	1	15
<i>Private Flying—</i>								
Registered	2.75	..	..	..	..	25	..	3
Unregistered aeroplane	..	..	..	1	..	..	..	1
Regular air transport—	..	..	..	..	1	..	..	1
Air mail service								
TOTAL INDIAN AIRCRAFT	11	2.5	1.75	2	1	75	1	20
<i>Non-Indian aircraft.</i>								
Private flying	1	..	..	..	..	..	1	2
TOTAL IN INDIA	12	2.5	1.75	2	1	75	2	22

APPENDIX IX.

Accidents—Indian Aircraft.

ANALYSIS OF PILOTS' ERRORS.

I.

Cause.	Licensed Pilots.	Pilots under Training.	Total.
<i>A. Solely pilots' errors.</i>			
(1) Stall when landing or approaching	4	..	4
(2) Bad landing	..	1	1
(3) Collision with obstacles in full flight	2	..	2
(4) Collision with obstacles landing	.75	1	1.75
(5) Collision while taxiing	1	..	1
(6) Stall while stunting	1	..	1
<i>B. Pilots' errors following other prime cause.</i>			
(7) Stall following engine failure taking off (2 accidents).	.75	..	.75
(8) Landing partially out of control in forced landing (2 accidents).	.5	.5	1
(9) Landing on bad ground in forced landing (1 accident).	1	..	1
TOTAL—PILOT RESPONSIBILITY	11	2.5	13.5
TOTAL ACCIDENTS—PILOT INVOLVED	13	3	16

II.

Cause.	Licensed pilots.	Pilots under training.	Total.
(a) Error of judgment	4.0	..	4.0
(b) Poor technique	4.0	2.0	6.0
(c) Carelessness	2.0	.5	2.5
(d) Disobedience of Rules	1.0	..	1.0
	11.0	2.5	13.5

APPENDIX X.

Major Accidents—Indian Aircraft.

	1932.
(1) Aircraft hours flown	11,550
(2) Aircraft miles flown (approx.)	992,000
(3) Accidents involving fatalities—	
(a) Crew	1
(b) Passengers	1
(c) Other persons	..
(4) Non-fatal accidents involving injuries—	
(a) Crew	2
(b) Passengers	..
(c) Other persons	..
(5) Number of killed—	
(a) Crew	1
(b) Passengers	1
(c) Other persons	..
(6) Number of injured—	
(a) Crew	2
(b) Passengers	..
(c) Other persons	..
(7) Miles flown per fatality	496,000
(8) Miles flown per injury or fatality	248,000

APPENDIX XI.

Licences and certificates issued and current during 1931 and 1932.

Licence and certificate.	Issued during 1931.	Issued during 1932.	Total Issued to end of 1932.	Lapsed to end of 1932.	Current on 31st December 1931.	Current on 31st December 1932.
1. Pilot's "A" Licences	123	104	387	191	197	196
2. Pilot's "A" Licences (Limited commercial pilot).	..	5	5	..	..	5
3. Pilot's "B" Licences	18	12	95	68	24	27
4. Pilot Instructors Licences	..	12	12	2	..	10
5. Ground Engineer's Licences	9	7	47	28	19	19
6. Certificates of Airworthiness	14	18	77	48	25	29
7. Certificates of Registration*	27	19	119	48	65	71

* The figures include only new certificates issued. Figures of aircraft re-registered have been excluded.

APPENDIX XII.
Aeronautical Wireless Stations in India and Burma.

Station and call sign.	Geographical position of Transmitter.	Transmitter power.	Normal Wave-length in metres.	Type of D. F. installation.	Position of D. F. apparatus from near-by aerodrome or town.
Karachi VWK	24° 51' 5" N 67° 2' 32" E	6-KW CW	900 metres also 600 metres when required.	Marconi-Adcock	Near Civil Aerodrome, Drigh Road, east of Karachi.
Jodhpur VWI	26° 15' 20" N 73° 2' 23" E	3-KW CW	900 metres	Marconi (Bellini-Tosi).	Close to Civil Aerodrome on S. W. side.
*Delhi VWD	28° 39' 15" N 77° 14' 30" E	6-KW CW	900 metres	*Nil	
*Allahabad VWA	25° 26' N approx. 31° 55' E	3-KW CW	900 metres	*Nil	
*Aurwiza VWC	22° 33' 31" N 88° 20' 16" E	6-KW CW	900 metres also 600 metres when required.	Marconi (Bellini-Tosi).	At Tollygunge, South of Calcutta.
Chittising VTC	22° 21' 39" N 91° 48' 27" E	14-KW CW	900 metres	Marconi (Bellini-Tosi).	At transmitter.
Akval VTA	20° 8' 41" N 92° 52' 16" E	3-KW CW	900 metres	Marconi (Bellini-Tosi).	At transmitter 1 mile N. W. of Aerodrome.
Sandoway VTS	18° 29' 14" N 94° 21' 9" E	14-KW CW	900 metres	Marconi (Bellini-Tosi).	At transmitter.
Bassein VTX	16° 47' 39" N 94° 45' 40" E	14-KW CW	900 metres	Marconi (Bellini-Tosi).	At transmitter.
Rangoon Aerodrome VTW	16° 57' 30" N. 96° 7' 43" E	6-KW CW	900 metres	Marconi-Adcock.	Close to and S. of Aerodrome, Prom Road.
Victoria Point VTV	9° 59' 15" N 98° 39' 15" E	3-KW CW	900 metres	Marconi (Bellini-Tosi).	At transmitter.

NOTE.—Hours of watch are published in a separate instruction.

* The D. F. stations near Delhi and Allahabad have been closed.

The current instruction should be consulted.

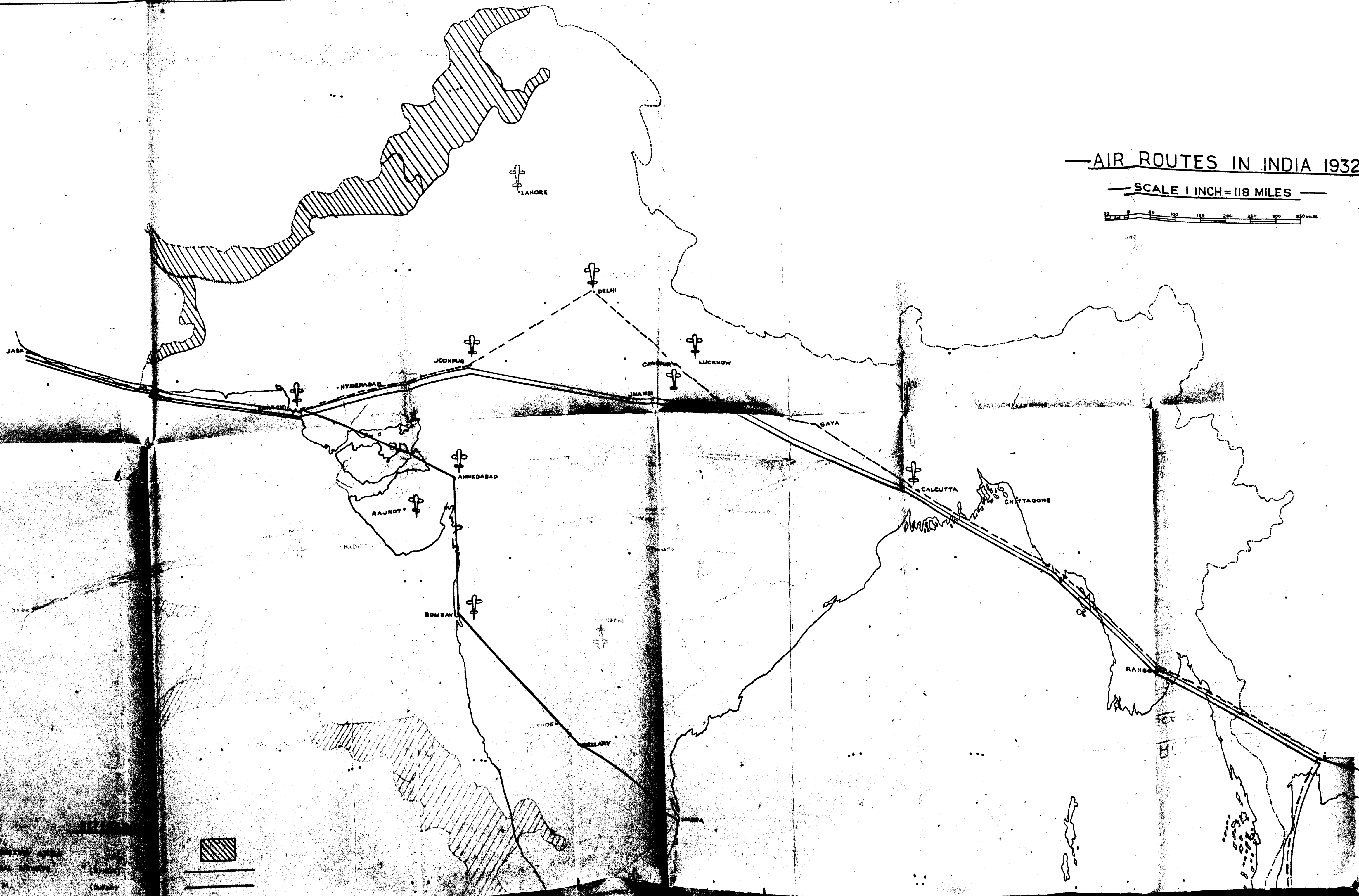
APPENDIX XIII.

Aeronautical Wireless Stations in neighbouring countries.

Station and call-sign.	Geographical position of transmitter.	Transmitter power.	Normal Wave-length in metres.	Type of D. F. installation.	Position of D. F. apparatus from near-by aerodrome or town.
Gwadar VTG	25° 7' 39" N 62° 18' 55" E	1-KW	900	Nil	
Lakzi HSLS	13° 32' 44" N 100° 34' 35" E	(Unknown)	900	(Type unknown)	Near Donmuang Aerodrome, Bangkok.
Penang VPX	50° 32' 03" N 100° 23' 51" E	3-KW	900	Nil	

—AIR ROUTES IN INDIA 1932—

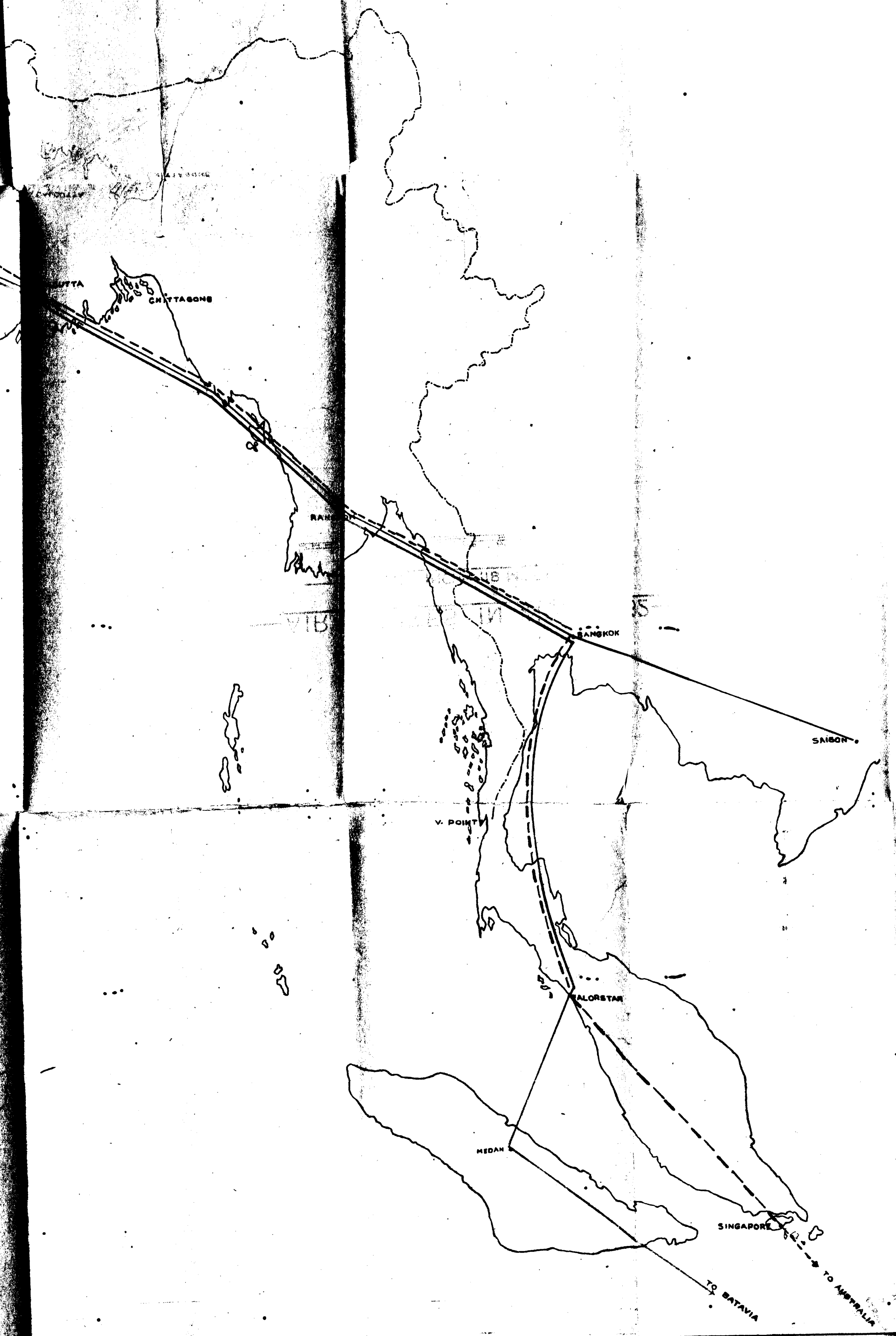
—SCALE 1 INCH = 118 MILES—



AIR ORIENT (French)
 AIR INDIA (British)
 AIR CHINA (Chinese)
 AIR AFRO-ASIA (Dutch)
 AIR ARABIA (British)
 AIR AUSTRALIA (British)
 AIR CEYLON (British)
 AIR BURMA (British)
 AIR SINGAPORE (British)
 AIR MALAYA (British)
 AIR SRI LANKA (British)
 AIR Ceylon (British)
 AIR Ceylon (British)
 AIR Ceylon (British)

—AIR ROUTES IN INDIA 1932—

—SCALE 1 INCH = 118 MILES—



PROHIBITED AREA

IMPERIAL AIRWAYS (British)

K. L. M. (Dutch)

AIR ORIENT (French)

INTERNAL AIR SERVICES (Indian)

PROPOSED EXTENSIONS

FLYING CLUB CENTRES (Existing)

FLYING CLUB CENTRES (Proposed)

PROHIBITED AREA

IMPERIAL AIRWAYS (British)

K. L. M. (DURAN)

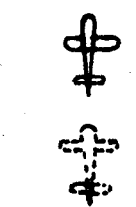
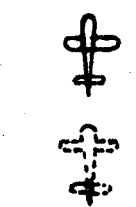
AIR ORIENT (French)

INTERNAL AIR SERVICES (Indian)

PROPOSED EXTENSIONS

FLYING CLUB CENTRES (Existing)

FLYING CLUB CENTRES (Proposed)



●

France

BELLARY

MADEA

TRICHINOPOLY.

COLOMBO

APPENDIX XII. Aeronautical Wireless Stations in India and Burma.

Station and call-sign.	Geographical position of Transmitter.	Transmitter power.	Normal Wave-length in metres.	Type of D. F. installation.	Position of D. F. apparatus from near by aerodrome or town.
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Jodhpur VWI	26° 15' 20" N 73° 2' 23" E	3-KW CW	900 metres	Marconi (Bellini-Tosi).	Close to Civil Aero- drome on S. W. side.
* Delhi VWD	28° 39' 15" N 77° 14' 30" E	6-KW CW	900 metres	* NW	
* Allahabad VVA	25° 26' N approx. 81° 55' E	3-KW CW	900 metres	* NW	
Calcutta VWC	22° 33' 31" N 88° 20' 16" E	6-KW CW	900 metres also 600 metres when required.	Marconi (Bellini-Tosi).	At Tollygunge, South of Calcutta.
Chittagong VTC	22° 21' 39" N 91° 48' 27" E	1½-KW CW	900 metres	Marconi (Bellini-Tosi).	At transmitter.
Akrah VTA	20° 8' 41" N 92° 52' 16" E	3-KW CW	900 metres	Marconi (Bellini-Tosi).	At transmitter 1 mile N. W. of Aero- drome.
Sandaway VTS	18° 26' 14" N 94° 21' 9" E	1½-KW CW	900 metres	Marconi (Bellini-Tosi).	At transmitter.
Bassein VTX	16° 47' 39" N 94° 45' 40" E	1½-KW CW	900 metres	Marconi (Bellini-Tosi).	At transmitter.
Rangoon Aerodrome VTW	16° 57' 30" N. 96° 7' 45" E	6-KW CW	900 metres	Marconi-Adcock.	Close to and S. of Aerodrome, Prope Road.
Victoria Point VTV	9° 59' 16" N 96° 33' 15" E	3-KW CW	900 metres	Marconi (Bellini-Tosi).	At transmitter.

NOTE.—Hours of watch are published in a separate instruction.
* The D. F. stations near Delhi and Allahabad have been closed. The present instruction should be consulted.