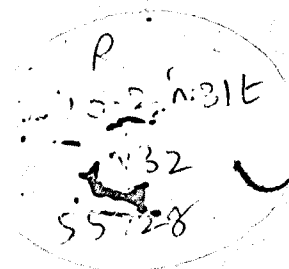


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India
1931-32



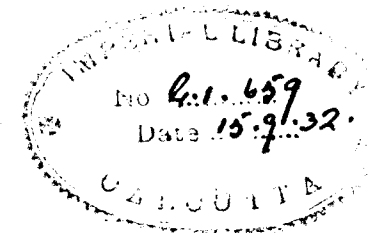
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Progress of Civil Aviation

(INDIA)

1931-32



GOVERNMENT OF INDIA

DIRECTORATE OF CIVIL AVIATION.

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CALCUTTA: GOVERNMENT OF INDIA
CENTRAL PUBLICATION BRANCH
1932

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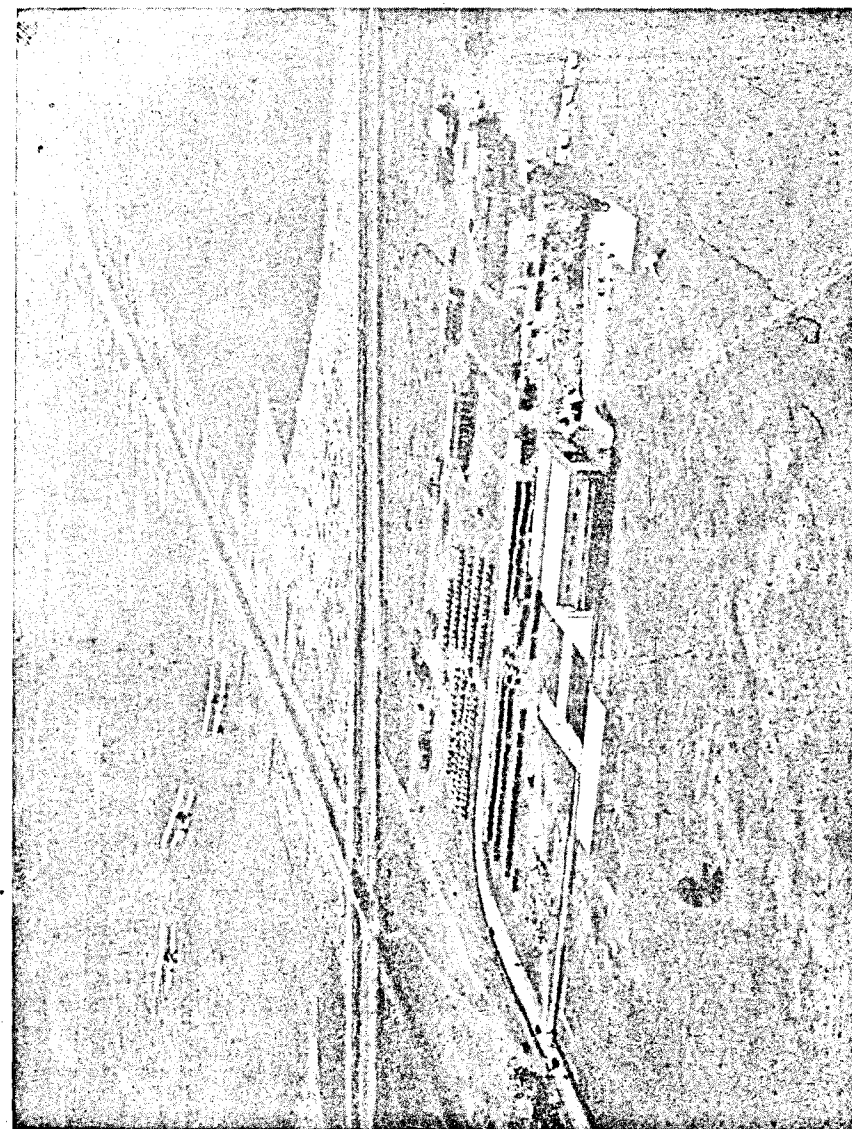
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DELHI.
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 A corner of the Delhi aerodrome on the day of the Delhi Flying Club Display, February 1932, showing a typical hangar on the trans-India route.



CHITTAGONG.

A typical landing ground on the Calcutta-Rangoon section of the trans-India route. The landing ground is built on paddy land by excavation from the two rectangular borrow pits adjoining the arms of the "L". The landing ground is provided with a chowkidar's hut, a telephone to the wireless station and town, and a small petrol store.

REPORT ON THE PROGRESS OF CIVIL AVIATION.

This report is compiled to cover developments in the period up to the 31st March 1932, but all statistics are given for the calendar year ending 31st December 1931, for ease of comparison with the statistics of other countries.

CIVIL AVIATION (1931-32).

The year was marked by a decisive halt in the development of all services requiring the expenditure of Government funds, the financial state of the country not permitting the expenditure of money on any but essential services. While, however, for this reason, the projected Indian State Air Service and developments in ground organisation had to be abandoned, there was continued development in actual flying operations. Efforts were devoted to consolidation and organisation of the ground services already provided, an attempt to organise air mail services on a non-subsidy basis, and the revision of the air regulations and in air traffic generally.

I. REGULAR AIR SERVICES.

(1) *Imperial Airways' London-Karachi Air Service.*—A weekly service to India was maintained throughout the year. Between the 21st May and the 16th October the summer schedule of a five day service was operated. Departure from London was made on Saturday and arrival at Karachi on Thursday. Departure from Karachi was made on Thursday and arrival in London on Tuesday. From the 16th October the time table reverted to the winter schedule of a six day service. Arrival and departure in London were maintained on the same days. Departure from Karachi was made on Wednesday and arrival on Friday.

In November, Imperial Airways began to replace their fleet of De Havilland "Hercules" which had operated the service since its commencement in 1929 by the new four-engined "Handley Page" 42 type. These aeroplanes are capable of carrying up to 38 passengers but as used on the eastern air route they are fitted up to carry a smaller number of passengers and greater space is devoted to mails and freight. The large cubic space per passenger and the reduction of noise practically to the level of that in a first class railway carriage have contributed largely to the recognition of this type of aircraft and places air travel, from the passenger's point of view, in a category comparable with sea and land travel. Towards the end of the year the service was operated entirely by the new type.

Some difficulty was experienced in maintaining the new summer schedule during the first few weeks. Later, however, regularity was restored until the end of November, when a combination of unusually severe weather conditions in the Mediterranean and initial troubles

with the new type of aircraft caused considerable delays, which, however, were again eliminated early in the new year.

Statistics with regard to the weight of mails carried by this service are given in Appendix I, passenger and freight figures in Appendix II.

(2) *Indian State Air Service Karachi-Delhi*.—Statistics with regard to the Karachi-Delhi section of the I. S. A. S. which continued to be operated up to the 29th December 1931, by aircraft chartered from Imperial Airways, Ltd., will be found in Appendix III. The Charter Agreement with Imperial Airways, Ltd., expired on the 29th December and was not renewed.

The Charter Service did not operate with its usual regularity during the period July-December 1931. In the month of July four flights were missed owing to engine trouble, and the delay entailed in providing a spare engine. One flight in August was not completed, and three in September were missed owing to exceptionally heavy rainfall at Jodhpur and Uterlai, rendering those landing grounds temporarily unfit for use. Four flights were missed in the month of December owing to the delayed arrivals of the London-Karachi Air Mail Service.

The Indian State Air Service from Karachi to Calcutta, the organisation of which had been commenced during the year under review, was definitely abandoned as part of the Government's retrenchment programme.

The first of the four Avro 10 aircraft ordered for the Indian State Air Service was completed and underwent its tests satisfactorily in August 1931. Two aeroplanes complete were sold to Airwork, Ltd., for the Egyptian Government. One of the aeroplanes was allocated to H. E. the Viceroy for official tours, and the fourth was still available for sale at the time of writing this report.

(3) *Delhi Flying Club Air Mail Service Karachi-Delhi*.—In order to avoid a break in the continuity of the air mail service on the termination of the charter agreement with Imperial Airways, while plans were being prepared for some other form of internal air service, a short term agreement was made with the Delhi Flying Club to operate the service for the carriage of mails only. To enable them to do this without disturbing their instructional fleet, a De Havilland Gipsy II Moth was provided by Government. As will be seen from the figures of mail loads carried by the charter service in Appendix III the mail loads are well within the capacity of the light aeroplane. These loads are not expected to increase largely until the service is extended further east because of the limited time saving advantages provided by a service to Delhi only. The Club is remunerated at a fixed rate per lb. of mail carried, and no subsidy is paid by Government.

Simultaneously with the introduction of this service, improved facilities were provided for north-west India by breaking the westbound journey at Hyderabad (Sind) and carrying forward to Karachi mails from the Punjab mail train on the morning of Imperial Airways' de-

parture, thus saving one day. Hitherto, owing to the impossibility of speeding up the mail train and equally of delaying Imperial Airways' departure, mails despatched by train to Karachi were obliged to lie in Karachi 24 hours before the air departure. The difference between the train time (4 hours) and air time (1 hour) from Hyderabad to Karachi enables the connection to be made. An arrangement was also made with the Jodhpur Flying Club to fly the south Indian mails (for Bombay, Madras, etc.) on the eastbound journey from Jodhpur to Falna (70 miles) thereby ensuring connection with the southbound mail train and saving one day. The Jodhpur Durbar provided a landing ground at Falna for this purpose.

The service was operated with complete regularity up to the end of the period under review—31st March 1932.

(4) *Karachi-Bombay-Madras Air Mail Service*.—Negotiations were carried on with Messrs. Tata Sons, Ltd., for the establishment of an air mail service connecting Bombay and Madras with the England-India air service at Karachi. The proposals at first under consideration involved the payment of a small subsidy, but when, as a result of the financial situation, the Government were forced to adopt a policy of not subsidising air transport, these proposals were rejected. Negotiations were then, however, resumed on the basis of payment only for mails actually carried at fixed rates per lb. This necessitates the employment of light aeroplanes in order to reduce the disparity between costs of operation and the product of the air mail surcharge. An agreement on this basis was signed shortly after the close of the period under review and the service will commence operation at the end of the monsoon of 1932.

(5) *Foreign Air Services across India*.—No new services were inaugurated during the year. 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 during the year 1931 by the Dutch Company, K. L. M., and the French Company, Compagnie Air Orient, were 64 and 56 respectively. As from the 1st October 1931, the K. L. M. service was operated weekly in each direction, while the French service continued on a fortnightly basis. The Dutch service continued to be operated mainly by Fokker F XII aircraft, and the French service by Fokker F VII. Statistics of the weight of mails carried by these services to India are given in Appendix I, while Appendix II gives details of passengers and freight carried to and from India.

Two accidents occurred within India in connection with the French Air Mail Service. These are dealt with under the heading of accidents.

(6) *Regularity and Punctuality*.—All the services operating to or across India were affected by severe weather in Europe at different periods of the year, and while no services were cancelled, delays in arrival at Karachi were involved.

Considerable interest having been aroused at times by the lateness of arrival of the air mail the figures following will be of interest. The figures are based on the arrival at Karachi of the eastbound services of Imperial Airways, the Royal Dutch Air Lines (K. L. M.) and the Air Orient (French). The Dutch and French services only commenced to operate to a regular predetermined schedule late in the year. The unscheduled services are excluded. The figures are based on Air Port records.

Company.	Number of scheduled services operated.	SERVICES DELAYED.		DAYS LATE.		
		Num-ber.	Percent-age.	Maximum.	Total.	Average.
Imperial Airways .	52	20	38%	5	36	0.69
K. L. M. . . .	26	10	38%	5	20	0.77
Air Orient . . .	18	5	28%	2	7	0.39

(7) *Imports and Exports by Air.*—The arrivals of aircraft from and departures for foreign countries and the value of merchandise and bullion imported into and exported from India by air during the last two years are given in Appendix IV.

II. PRIVATE FLYING.

(1) *Flying Clubs.*—The Government subsidy to the flying clubs was made on the same basis as in the previous year. The six Flying Clubs at Karachi, Delhi, Bombay, Calcutta, Lahore and Madras each received a subsidy of Rs. 20,000 during the year 1931-32, and in addition a bonus calculated at the rate of Rs. 150 for each pilot trained to "A" licence standard during the year, subject to a maximum of Rs. 5,000. In no case was the maximum bonus earned. The Aero Club of India and Burma, Ltd., received a reduced subsidy of Rs. 20,000.

An important change was made in the organisation of the Delhi Flying Club which extended its activities to Cawnpore and Lucknow, where branches were opened in July 1931, flying activities being started in the same month. The Club is now known as the Delhi and United Provinces Flying Club, Ltd. No additional subsidy is paid to the Club in respect of the new centres, but members trained at these centres count for bonus purposes as members of the Delhi Flying Club. European pilot instructors were appointed at each centre.

A new flying club was formed at Jodhpur through the initiative and with the assistance of H. H. the Maharajah of Jodhpur. A new club hangar with offices, workshops and member's rooms was built on the Jodhpur aerodrome. Two D. H. Gipsy I and one Gipsy II Moths were purchased, a European pilot instructor and Ground Engineer

engaged, and the official opening took place on the 16th November 1931. The Club has 38 members.

Towards the end of the year, as the result of demonstration and joy ride flying carried out by the Bombay Flying Club in the Kathiawar States during the monsoon, when the Juhu Aerodrome was out of action, there was evidence that interest in flying in this region had been aroused. H. H. the Rajah of Junagadh bought a D. H. Gipsy I Moth and engaged a pilot. Tentative efforts were also made at the formation of a Kathiawar Flying Club, centred at Rajkot.

The total membership of the flying clubs increased from 1,596 to 1,880. The number of aircraft employed by the Clubs on 31st December 1931 was 20 as compared with 19 in the previous year. A total of 9,070 hours' flying was performed as against 7,542 hours in 1930.

A conference of flying club instructors and representatives was held in New Delhi on the 21st February, under arrangements made by the Aero Club of India and Burma, Ltd., to discuss the matters of common technical and administrative interest.

The total number of pilots trained *ab initio* in all the Clubs in India during the calendar year 1931 was 113, an increase of 20 over the number trained during the year 1930. The number of pilots to whom "A" licences were issued during the year was 123; of this number 48 were Indians and 75 were Europeans. Two pilots were trained by the Delhi Flying Club, and qualified for the issue of "B" licences (Commercial pilot's licence) during the year 1931.

The Clubs are employing an increasing number of Indians, the number of employees on the 31st December 1931 being as follows :—

	Clerical.	Menial.	Technical.	Total.
Europeans	..	..	20	20
Indians	28	69	30	127
	28	69	50	147

The total number of passengers carried during the year 1931 on taxi flights and joyriding was 3,247 as against 2,519 during 1930. The number of hours flown in privately owned aeroplanes was approximately 1,087. A summary of the activities of the Clubs will be found in Appendix V.

(2) *Competitions, Viceroy's Trophy.*—Their Excellencies the Viceroy and Lady Willingdon, in presenting a silver cup known as the Viceroy's Challenge Trophy to be competed for annually, gave a further impetus to civil flying. This marked the beginning of sporting flying in India. The Aero Club of India and Burma as the representatives of the Federation Aeronautique Internationale in India, undertook the organisation of an air race for the Viceroy's Trophy.

The Managing Committee of the Irwin Flying Fund, referred to in last year's report, decided to support this competition as the best means of advancing the objects for which the Fund was established, and made a substantial contribution from the first year's revenue of the Fund, towards the prize money. Besides the Viceroy's Trophy, other valuable trophies and cash were presented by business firms connected with aviation.

The race started and finished at New Delhi on the 20th February 1932, the course being Delhi-Agra-Jhansi-Lucknow-Agra-Delhi, a distance of 709 miles, with compulsory stops of 30 minutes at each of the abovementioned control points. The competition for the Viceroy's Trophy was a handicap race open to all Indian pilots and any other pilots who were holders of an "A" licence (but excluding "B" licence holders), who had been trained by a flying club in India or elsewhere. There were eight entries for the Viceroy's Trophy (two D. H. Puss Moths; one Desoutter; five D. H. Gipsy I Moths).

At the same time a formula competition was held over the same course, based on economy and speed in carrying a load over a given distance. The formula was designed to test both the aircraft and the pilot's ability in airmanship, including navigation, and was of interest in view of the use of light aeroplanes for mail carrying in India. There were four entries (all D. H. Gipsy I Moths) for the formula competition, including two ladies.

All the competitors except one completed the course. The Viceroy's Trophy was won by Dr. Spioull of the Punjab Flying Club, and the Formula Competition by Gurbajan Singh of the Delhi Flying Club, both flying D. H. Gipsy Moths. The fastest time round the course was made by Mr. W. C. Wingfield of the Bombay Flying Club on a D. H. Puss Moth at an average speed of 120.5 m. p. h.

(3) *International flights*.—There were no flights carried out by Indians.

The number of casual long distance flights by foreign and non-Indian aviators across India during the year 1931 was 16. These were distributed as follows :—

British	4
French	2
Italian	1
American	3
Australian	3
Roumanian	1
German	2

In addition three flights were carried out from India to England.

Among the notable flights were :—

- (1) July. J. A. Mollison, D. H. Gipsy II Moth, record flight from Australia to England 8 days 22½ hours.
- (2) November. C. A. Butler, Comper Swift, record flight from England to Australia 9 days 2½ hours. Since reduced by C. W. Scott to 8 days 19½ hours.

(3) December. Air Commodore Kingsford Smith, Avro 10, experimental Xmas mail service from Australia to England and back. Return flight made on 12th January 1932.

(4) December. Fraulein Elly Beinborn, Klemm L26, Germany to China.

There were two accidents in connection with these flights, one with unfortunately fatal results. These were the forced landing and destruction by fire of Prince Bibesco's Ford Trimotor, and the sinking, after landing in a heavy sea, of Captain Hans Bertram's Junker seaplane.

III. ACCIDENTS.

While the Indian Aircraft Act does not provide statutory powers for the investigation of accidents, a system of investigating and reporting on all accidents occurring in India was put into force in June 1931. All accidents involving serious structural damage, failure of controls in the air, fire or injury to personnel are notifiable. Of these, the less serious accidents are investigated by technical personnel from the Flying Clubs or other organisations nearest to the scene of the accident. In the case of serious accidents or accidents due to unusual causes, an investigation is carried out by the Aircraft Inspection staff of the Government of India.

A different method of classification of accidents has in consequence been adopted in this year's report, following the more common practice in other countries. Minor mishaps resulting in slight damage to the aircraft are not dealt with in the report. Accidents involving death or injury to personnel are classed as major accidents, while all other notifiable accidents involving only structural damage to the aircraft are classed as minor accidents.

The following table shows the number of accidents occurring in India during 1931, divided between Indian and foreign aircraft.

ACCIDENTS IN INDIA.

Class of flying.

	Major.	Minor.	Total.
<i>Indian Aircraft.</i>			
(1) Regular Air Transport	..	..	..
(2) Other flying for hire	..	..	..
(3) Flying Club flying	1*	17	18
(4) Private flying	..	..	..
TOTAL (INDIAN AIRCRAFT)	1	17	18
<i>Foreign Aircraft (in India).</i>			
(1) Regular Air Transport	1*	1	2
(2) Casual Flights	2 (1*)	..	2
TOTAL (FOREIGN AIRCRAFT)	3	1	4
TOTAL (ACCIDENTS IN INDIA)	4	18	22

* Fatal accidents.

The accidents are further analysed in the tables in Appendices VI, VII and VIII.

Appendix VI classifies the causes of all the accidents occurring in India. Appendix VII further classifies the causes of those accidents due to errors of the pilot. Appendix VIII deals with major accidents in Indian aviation, viz., those involving fatalities or injury to personnel and compares the accident statistics with the hours flown. It will be observed that all the accidents in Indian aviation occurred in connection with Club flying. Other forms of civil aviation in India are as yet very little developed.

It will be observed in the analysis of causes that the accidents in Indian aviation are mainly due to pilot's errors. While power plant failures have occurred, none has been followed by a notifiable accident. Structural failures have been entirely absent, while bad weather is a factor which does not normally enter into Club flying. Most of these pilot's errors are attributable to lack of experience. The following are worthy of special note :—

- (1) The one major accident was due to the pilot on landing colliding with a group of people on the landing ground. One was killed and one injured. This was partly due to carelessness on the part of the pilot, and partly due to lack of aerodrome control in allowing the public to be on the landing area.
- (2) Two accidents were due to breach of the Indian Aircraft Rules regarding low flying. Both were in the course of unauthorised and unjustifiable exhibition flying. In one case the aircraft, piloted by an unlicensed pilot, while flying over a town, collided with an obstruction in flight. The pilot was prosecuted, convicted and fined Rs. 100. In the other case, the pilot endeavoured to carry out an unauthorised landing on an unauthorised landing ground.
- (3) One accident, involving a collision between two aircraft on the ground, while landing in divergent directions, was due to a disregard of the Indian Aircraft Rules relating to aerodromes.

The pilots' licences were suspended until they had again passed the examination in Rules of the Air.

Of the four foreign aircraft which met with accidents in India, two were unfortunately fatal.

(1) The French air mail aeroplane from Saigon was caught in a bad monsoon storm on the Burma coast on the 7th June 1931, and, while apparently attempting to make a landing, flew into trees. The four occupants were killed.

Since this date, the landing grounds, wireless stations and meteorological organisation which were in process of construction and organisation have been completed and improved, and it is hoped that the

improved organisation will go some way to minimise the danger from monsoon weather on this coast.

(2) The Roumanian aeroplane conveying Prince Bibesco on a flight across India on the 17th April 1931, struck a vulture in flight near Benares. Some structural damage to the wing occurred. The pilot decided to land and the aeroplane turned over on rough ground, caught fire and was destroyed. One pilot died subsequently; the other was seriously injured.

(3) The French air mail aeroplane of 30th September 1931 after leaving Karachi was caught in thick fog at Sonmiani on the Mekran coast. The pilot landed on soft ground. The aircraft was damaged and subsequently destroyed by fire.

(4) Captain Hans Bertram, flying a Junker seaplane round the coast of India, landed at Vizagapatam on 24th September 1931, in a heavy monsoon storm. There was insufficient shelter and the seaplane was sunk by the rough seas. The crew were rescued.

A class of accident which is liable to be common in India, owing to the presence of large numbers of scavenger birds, is collision with birds in the air. Apart from the case of Prince Bibesco's aeroplane, four other collisions with birds in flight are known to have occurred in the course of civil flying in India during the year. All resulted in minor damage to the aeroplane.

IV. MISCELLANEOUS FLYING AND COMMERCIAL ACTIVITIES.

(1) *Tours by Air of H. E. the Viceroy.*—Following the decision to sell the Avro 10 air craft built for the Indian State Air Service, it was decided that one of these aircraft should be allotted to His Excellency the Viceroy for touring purposes. It was calculated that considerable savings in the cost of His Excellency's official tours would thereby be effected, both in regard to the cost of running the special train normally used and in the matter of special police protection required on railway journeys. These anticipations have been confirmed, particularly as regards the cost of special police protection.

The aeroplane VT.ACT was flown to India by Mr. N. Vincent, D. F. C., acting Deputy Director of Civil Aviation arriving on the 3rd December. While the civil registration of the aircraft has been retained, its operation on behalf of His Excellency has been undertaken by the Royal Air Force. The Avro 10, not having arrived in India in time for the first official tour from Delhi to Calcutta early in December, the flight was undertaken by the Delhi Flying Club.

His Excellency the Viceroy, accompanied by the Countess of Willingdon and staff, flew from Delhi on the 4th December 1931, in privately owned aircraft, one Desoutter and one Puss Moth, operated by the Delhi Flying Club and escorted by a Royal Air Force Wapiti. The machines left Delhi about 6-15 A.M. and reached Calcutta the same

afternoon at about 4-30 P.M. The return journey from Calcutta was carried out on the 2nd January 1932 in the Avro 10 aircraft, which left Calcutta at about 6-30 A.M. arriving in Delhi the same afternoon at about 4-15 P.M.

(2) *De Havilland Aircraft Co., Ltd.*—This company, whose products are still more widely used in India than all others, have maintained since 1st October 1929 a sales and service organisation at Karachi. The sales of aircraft and engines through this branch since that date have been as follows :—

	Value. Rs.
1929-30 (6 months)—	
10-100 H. P. Gipsy I Moths	1,18,880
1-100 H. P. „ I Engine	
1930-31—	
8-120 H. P. Gipsy III Puss Moths	2,04,210
7-100 H. P. „ I Puss Moths	
1-100 H. P. „ I Engine	
1931-32—	
4-120 H. P. Gipsy III Puss Moths	1,71,350
3-120 H. P. „ II Puss Moths	
6-100 H. P. „ I Puss Moths	
1-120 H. P. „ II Engine	
1-100 H. P. „ I Engine	

During 1931-32 the company reconstructed four D. H. Moths for Certificates of Airworthiness.

(3) *Approved Firms.*—The following firms received provisional certificates of approval as distributors of aircraft parts and material, their storage and distribution arrangements having been inspected and found satisfactory :—

Firm.

De Havilland Aircraft Co., Ltd., Karachi.
 Indian Air Survey and Transport Ltd., Dum Dum, Calcutta.
 Hoosenbhoy, Karimji & Co., Karachi.
 A. R. Haseler, Bombay.
 French Motor Car Co., Ltd., Calcutta.

(4) *Mosquito Control, etc.*—One or two experimental flights were carried out by the General Export Co., of Calcutta, working in conjunction with the Garden Reach Anti-Malaria Association, over the swamps to the east of Calcutta for the purpose of testing the efficiency of dusting from the air as a means of destroying mosquito larvae. It is intended to continue these experiments during the next monsoon and post monsoon seasons.

An aeroplane was used by the Bengal Chamber of Commerce and the Bengal Jute Growers' Association in March 1932 to distribute leaf-

lets in the jute growing districts of Bengal, urging the restriction of planting. Nine flights totalling approximately 23 hours were made and over 300,000 leaflets dropped over several hundred villages in nine days.

(5) *Gliding and Soaring.*—An Indian Gliding Association with its Headquarters at Bombay was established in August 1931 and is affiliated with the British Gliding Association. The Association have acquired a gliding ground presented by the Ruler of Aundh in Aundh State, situated in the Western Ghats 65 miles S. E. of Bombay; a hangar has been built. Nearly 200 glides in a primary type of glider have been successfully made, the longest glide being one of 3½ minutes duration and covering a distance of nearly a mile. The Association's flying equipment consists of one primary glider (American Mead type) while two others (German Kassel type) are under construction. A secondary glider is also being acquired. Out of 109 members at the end of the year, 7 including two Indian ladies, received training on the primary type of glider. An Indian "B" licence pilot, Mr. P. M. Kabali has been appointed as instructor.

(6) *Air Survey and Photography.*—The majority of the work carried out by Indian Air Survey and Transport Ltd., during the year 1931 was for the preparation of Cadastral maps on a scale of 16" to 1 mile for settlement purposes in Bengal and the United Provinces. The company undertook the whole of the work including photography, plotting and production of the final map. The area photographed during 1931 was 2,712 square miles as compared with 3,422 square miles in 1930.

The following table shows the total area surveyed by the company in its operations up to date :—

	Square miles.
Total area surveyed	315,335
Area photographed on a negative scale of over 6" to 1 mile for preparation of 16" to 1 mile settlement maps	9,240
Other areas photographed on a negative scale of between 6" and 8" to 1 mile	774
Town areas photographed on a negative scale of over 8" to 1 mile	60

In Appendix IX will be found a complete schedule of the areas surveyed by the company up to the end of 1931. The location of the most important of these surveys is shown on the map (Appendix XI). In the early months of 1932 a number of maps of towns in the Punjab was completed on the large scale of 32" to 1 mile.

The fleet of D. H. 9 aircraft ceased to be employed on air survey work in March 1931. The active fleet now consists of one De Havilland Puss Moth and one Avro Avian. A total of 290 hours flying was performed during the year.

The activities of the company may be judged from the staff employed.

	European.	Indian.	Total.
Flying and Engineering	5	17	22
Survey, Photography and Drawing Office	3	35*	38
Clerical	..	8	8
Other personnel	..	6	6
TOTAL	8	66	74

V. ADMINISTRATION.

(1) *Civil Aviation Budget.*—The provision made for civil aviation in the Budget for the year 1931-32 was Rs. 35,77,000. This figure was made up as follows :—

	Rs.
(1) Direction and staff	2,27,900
(2) Indian State Air Service (Karachi-Calcutta)	10,49,500
(3) Charter Service (Karachi-Delhi)	3,68,600
(4) Works	13,00,000
(5) Grants to Clubs	1,88,000
(6) Wireless	4,13,000
(7) Miscellaneous (including scholarships)	30,000
TOTAL	35,77,000

In view of the need for economy, the figure of Rs. 35,77,000 was reduced during the year to Rs. 23,05,000. The main headings under which this saving was effected are :—

	Rs.
(1) Indian State Air Service. Abandonment of programme	4,28,000
(2) Works—Elimination of route lighting programme	6,70,000
(3) Wireless Services †	1,74,000
TOTAL	12,72,000

At the time the retrenchment decisions were taken in 1931, the Civil Aviation budget figure for 1932-33 was fixed at approximately Rs. 9 lakhs. After minor adjustments the final figure accepted in the budget for 1932-33 was Rs. 8,93,900.

* The drawing office staff usually numbers 75 and has since been increased.

† The saving under wireless services was only partly accounted for by an actual reduction of services. The bulk was due to more precise figures becoming available as to the actual cost of the services.

The percentage reductions in expenditure were therefore :—

1931-32	35.8%
1932-33	75.0% (as compared with 1931-32).

(2) *Deputy Director-Appointment.*—It had been decided to appoint a Deputy Director of Civil Aviation during the year, and when the Indian State Air Service organisation was abandoned, Mr. N. Vintcent, D. F. C., the Manager took over the duties of Deputy Director with effect from the 4th December 1931.

(3) *Tours of the Director of Civil Aviation in India.*—The Director of Civil Aviation in India carried out three tours of inspection during the year covering the bulk of the organised and prospective air routes in India and Burma. The majority of the travelling was carried out by air.

	MILEAGE.	
	Air.	Other means
<i>April 1931.</i>		
Delhi, Karachi Air Route	2,120	..
Karachi, Bombay Air Route		
Bombay, Delhi Air Route		
<i>October 1931.</i>		
Delhi, Cawnpore, Lucknow, Allahabad, Benares, Mirzapur, Agra, Karachi, Quetta, Chaman, Delhi.	2,370	730
<i>January 1932.</i>		
Delhi, Calcutta, Chittagong, Akyab, Sandoway, Bassein, Rangoon, Mandalay, Calcutta, Moghul Serai, Delhi.	1,770	1,800
TOTAL .	6,260	2,530

The third tour took 16 days including 10 days spent on business, not travelling. The normal time of travel alone would have been 13 days. Mandalay to Calcutta was flown between breakfast and tea time. This journey normally takes 5 days.

(4) *Aerodrome Control.*—Aerodrome officers have been appointed to Calcutta (Dum Dum), Rangoon (Mingaladon) and Allahabad (Bamrauli). Karachi Air Port is administered by the Officer-in-Charge of the Royal Airship base. In order to save the post of an Aerodrome Officer it was decided that the Civil aerodrome at New Delhi should be administered and controlled by the Delhi Flying Club, on behalf of the

Government subject to the orders of the Director of Civil Aviation in India. The Club took over the administrative control of the Aerodrome with effect from the 1st November 1931. At Akyab, the Executive Engineer, P. W. D., carries out certain of the duties of an Aerodrome Officer.

(5) *Licences and Certificates.*—The number of licences and certificates issued and current during the year 1931, with comparative figures for previous years is shown in Appendix X.

(6) *Civil Aviation Scholarships.*—No further candidates were selected for training during the year. There were four students under training in England during the year as aerodrome officers and two as aircraft inspectors. The four first mentioned completed their courses at the end of 1931 and returned to India. One was selected for appointment on a probationary basis to Karachi to gain further practical experience and to act as assistant to the Officer-in-Charge.

The two Aircraft Inspector students will not complete their courses until 1933.

(7) *Indian Aircraft Act and Rules.*—The drafting of a new Act was put in hand and it is hoped to present a bill to the Assembly during one of the sessions in 1932.

The following new orders or notifications under the Indian Aircraft Rules, 1920, were issued during the year:—

(1) An Order No. T-24, dated 6th July 1931, permitting the carriage in aircraft of photographic or cinematographic apparatus under certain conditions.

(2) A Resolution No. W-36, dated 11th September 1931, revising the scale of housing and landing charges at Government Civil Aerodromes. The general effect is to increase the scale. Special reduced rates of landing fees are provided for aircraft fitted with tail wheels. Supplementary landing fees are required for aircraft fitted with W/T apparatus and for night landings. Progress was made with the revision of a portion of the Indian Aircraft Rules, 1920, in order to bring them into line with the International Convention for Air Navigation, and it is expected that the revision will be completed during the year 1932, provided that the revised act has by that time become law. A portion of the revised Rules has already since been brought into effect. This deals with Registration and Marking of aircraft, Log Books, and a number of miscellaneous points affecting customs.

(8) *Aircraft Inspection.*—During 1931 the aircraft inspection staff consisted of one Aircraft Inspector only, who was normally stationed at Karachi. Half-yearly tours of inspection are carried out by the Inspector to all flying club centres and operating companies' bases for the purposes of inspection of aircraft for issue or renewal of Indian Certificates of Airworthiness, check inspection of airworthiness of aircraft in respect of which Indian Certificates of Airworthiness are valid, the examination of applicants for Ground Engineers' licences and the

supervision of the work of licenced Ground Engineers. During the year about 50 inspections of aircraft for issue or renewal of Certificates of Airworthiness were carried out.

The more serious aircraft accidents and those for which the cause is obscure are investigated in detail by the Aircraft Inspector, and during 1931 three accidents were investigated by him. Wherever it is possible to arrange, a Board of Enquiry is convened comprised of one or more local persons with a knowledge of flying, the Aircraft Inspector acting as Chairman.

The testing of materials used in aircraft construction and repair, an important ancillary to inspection, requires elaborate and expensive apparatus and specialised knowledge. As a temporary expedient specimens for test have from time to time been forwarded to the British Air Ministry. At the same time however existing facilities in India have been explored with a view to carrying out such tests locally and as a result of close co-operation full facilities are now available at the Forest Research Institute, Dehra Dun, for testing aircraft timbers, plywood, glues, and certain other aircraft materials. Arrangements were also made with the Forest Research Institute for carrying out a special series of tests on aircraft glues and specimen glued joints, and the deterioration in strength of aircraft timbers with especial reference to tropical conditions. All Ground Engineers licenced for aircraft inspection were instructed to submit specimen glued joints for strength tests and examination; as a result very considerable improvement not only in glueing methods but also in the quality of glues used has resulted. Check tests for strength were also carried out on wooden structural members which had failed in accidents. In one instance by this means it was ascertained that material rejected by the Royal Air Force as unserviceable for use on aircraft had been used in the repair of an aircraft in respect of which a Certificate of Airworthiness was valid.

With respect to tests on metals, arrangements have been made for certain strength tests on aircraft metals to be carried out by Government Test Houses, whilst microscopical examinations will be made by the Metallurgical Inspector, Jamshedpur. These arrangements are of special importance in regard to welding, particularly in view of the increase in the percentage of metal aircraft structures embodying an extensive amount of welding. All such welding both in construction and repair must be carried out by personnel who have been proved, as a result of strength tests and microscopical examination of specimen welds submitted by such personnel, to be competent to make satisfactory joints with the specialised materials used on aircraft construction.

Information in regard to airworthiness of aircraft, inspection matters and Ground Engineers is notified in a booklet entitled "Handbook of Instructions to Aircraft Owners and Ground Engineers," which contains information of a more or less permanent and general nature. The first issue of this booklet was compiled in July last and about 200 copies

were distributed before the end of the year. Notices to Aircraft Owners and Ground Engineers contain, in general, information in regard to compulsory and desirable modifications to specific types of aircraft and aero engines and concerning which matters early notification is desirable. The number of these Notices issued in 1930 was 32 but during the year under review 59 Notices were issued. Some of these were reproduced from Air Ministry Notices, adapted where necessary to conditions in India, whilst others resulted from experience of troubles apparently peculiar to India.

In order to obviate certain irregularities in the use of unsuitable material similar to that referred to above, a system of approved distribution of aircraft materials and spare parts was introduced. Under this scheme, all materials or spare parts used on aircraft, for which a Certificate of Airworthiness is required, must be duly covered by a 'Release Note' issued by an Approved distributor, who has to maintain a 'bonded store' reserved for aircraft goods and may issue 'Release Notes' only in respect of materials and parts received by him with 'approved evidence of inspection,' i.e. approved documentary evidence indicating, in the case of materials, that they have been properly tested and proved to comply with the relevant aircraft specifications, and in the case of spare parts in the finished condition, that all manufacturing processes have been carried out by satisfactory methods and that all dimensions are correct. The system enables the entire history of any material or part covered by a 'Release Note' to be traced in one continuous and unbroken chain right back to the raw material, and ensures that only airworthy material is incorporated on aircraft holding Certificates of Airworthiness.

During the Aircraft Inspector's half-yearly inspection tours, the storage arrangements and office facilities of applicants for approval as agents and distributors of aircraft materials and spare parts are inspected, and supervision carried out of the distribution arrangements of firms already approved.

(9) *Life of Aircraft in India.*—The majority of civil flying carried out in India, up to the present, has been instructional and, as is the case in all such work, has involved a number of accidents, the majority of which fortunately have been of a very minor nature and without injury to personnel. The result of these breakages, however, has been that, in general, components of aircraft have been written off, not on account of age or deterioration, but owing to serious structural damage, resulting from accidents of a minor nature. At the present time, Certificates of Airworthiness are valid for less than 20% of the aircraft registered in 1929. In regard to private aircraft, a similar position exists, owing in general to lack of experience of pilots, many of whom bought aeroplanes after less than 50 hours flying experience, coupled with failure on the part of the average private owner to appreciate the importance of having the maintenance of his aircraft carried out by competent personnel.

Experience of operating aircraft in India, where repair centres are not highly developed and certain special climatic conditions exist, has confirmed a number of conclusions concerning the relative advantages and disadvantages of wood and metal aircraft structures. Normally a longer life may be expected from steel structural members than from wooden parts, before, in the former case, corrosion, and, in the latter case, deterioration of the timber render such parts unairworthy. The relative rates of deterioration differ in various parts of India—corrosion of metal for example, proceeding more rapidly in the humid regions such as Bombay, than in the drier zone of northern India. Wooden aircraft of equivalent structural strength to a metal aircraft can at present be built at a lower initial cost and at a lower weight. The most important differences arise, however, in connection with repairs, and the following are a few of the points of importance which have been observed in India :—

(1) Owing to difficulties in making internal inspection for corrosion of tubular steel structural members, proper maintenance, in localities where corrosion is known to be severe, is more difficult than in the case of wood members.

(2) In the case of tubular metal structural members, which are drilled for the attachment of fittings and are not hermetically sealed, and which rely for resistance to corrosion on the presence of an internal coating of oil, varnish or enamel, this coating is destroyed in welding, and in many cases it is almost impossible to replace it satisfactorily.

(3) Experience has shown that, owing to the prevalence of failure of metal structural members at the junction of tubings and fittings, only in exceptional cases is it possible to utilise the bolted or riveted types of repairs indicated in certain aircraft approved repair schemes.

(4) Repair of wooden structures is definitely simpler and cheaper in present conditions in India than equivalent repairs of metal structures. The equipment required for repair of wood members is simple and readily available.

(5) It is considered that, if first class timber is used and the timber is adequately protected against deterioration by the latest methods, depreciation costs are likely to compare favourably with those of metal aircraft.

(6) While there is an undoubted advantage in the use of metal structures in certain regions and for certain types of operation where adequate repair plant can be installed, there is still an advantage in the use of wood structures for operation in conditions which preclude the establishment of expensive welding plant in close proximity.

(7) Metal aircraft structures built up from a number of small components bolted or riveted together, any of which parts could, if required, be replaced by a new spare part, would facilitate repair work, which advantage would, however, be partially offset by additional cost of manufacture.

(8) The life of aircraft is considerably shortened by exposure on the ground during the day to the sun's light and heat, and during the night to heavy dew, all of which conditions are severe in India. It is important that wherever possible suitable hangar accommodation should be made available and used. It is also important that the improvements which have been effected in the course of the last two or three years in such processes as the manufacture of plywood, gluing and protection of timber against corrosion, should be made full use of in aircraft for use in India.

(10) *Prosecutions under the Indian Aircraft Act.*—There were two prosecutions under the Act and Rules for low and dangerous flying. In both cases the pilots were convicted. One case was followed by an accident and is dealt with under the accidents section of the Report.

The second case also involved low flying over a town. The pilot was convicted and fined Rs. 75.

(11) *International Conventions.*—India was represented at the 19th Session of the International Commission for Air Navigation in Paris by Mr. E. J. Turner of the India Office.

The draft International Convention for the Sanitary Control of Aerial Navigation which has been drawn up by the Office International d'Hygiene Publique, Paris, has been subjected to examination during the year in conjunction with the Education, Health and Lands Department. India was represented at the meeting to discuss the draft Convention in Paris in May 1931 by the Public Health Commissioner with the Government of India. The Convention is designed to regularise the measures of health inspection, surveillance and quarantine of personnel in International air transport.

The draft Convention on liability of carriers by air drawn up by the Comité Internationale Technique D'Experts Juridiques Aeriens has been subjected to examination with a view to the ultimate adhesion of India. The Convention is intended to define the liabilities of air carriers towards passengers and consignors of goods by air.

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

(13) *Air Navigation in Indian States.*—As a result of discussions and correspondence concerning the relationship of Jodhpur Durbar to the Government of India in regard to the regulation and administration of civil aviation, principally arising from the fact that the international air route across India crosses Jodhpur, an informal agreement was reached with the Jodhpur State authorities on the means to be adopted to give effect to the Summary of Principles, mention of which was made in last year's report, as well as on general matters of organisation and administration not resting on legislation and regulations.

(14) *Helium Research.*—The possibility of India being a source of supply of Helium having been suggested, a small grant of Rs. 2,500 was made for the collection of samples of natural gas from oilfields in India and Burma, and their examination for helium content. The

samples were collected by the Director of Geological Survey and arrangements were made for their examination at the Indian Institute of Science, Bangalore. The examination has not been completed.

The grant was made from the special fund for research, experiments, etc., accruing from the two annas tax on petrol used in aviation.

VI. GROUND ORGANISATION.

(1) *Budget.*—The sum of Rs. 13 lakhs provided for works services Budget for 1931-32 was allocated as follows:—

	Rs.
(1) Route lighting—Karachi-Delhi Route . . .	6,22,000
(2) Bombay (Juhu) Aerodrome—preparation . . .	3,17,600
(3) Calcutta-Rangoon Route—completion of landing grounds (including minor expenditure Karachi-Calcutta Route) . . .	73,000
(4) Minor new works and equipment . . .	94,000
(5) Maintenance . . .	63,000
TOTAL	13,00,000

(2) *Route lighting.*—A scheme was prepared for the lighting of the Karachi-Delhi section of the trans-India air route, over which it was intended to operate by night through the medium of the Indian State Air Service. The scheme provided for combined floodlight beacons, automatic illuminated wind T's, boundary lights and obstruction lights at the main aerodromes, location beacons, automatic wind T's, boundary lights and obstruction lights at intermediate landing grounds, and high and low power route beacons distributed along the route.

The necessity for economy forced the abandonment of this scheme together with the operation of the Indian State Air Service.

(3) *Bombay (Juhu) Aerodrome.*—Filling work continued throughout the year with the exception of the monsoon period. Towards the end of the year, unexpected difficulties arose in the supply of murrum for filling, which retarded the work. The actual sum spent during the year was Rs. 2,12,600 approximately, the remainder being carried over to the year 1933-34. A new quarry for material was opened, and it is expected that the filling work will be completed before the monsoon of 1932.

The construction of "filled" aerodromes in this country presents several difficulties. Such aerodromes cannot be expected to be permanently serviceable for several years. In the first place, however, much rolling may be carried out, the loose ground does not begin to consolidate until it is subjected to the heavy monsoon rains. During the rains, the ground becomes very soft and irregular settlement inevitably takes place, requiring further filling after the monsoon. The ground only becomes properly consolidated after a succession of monsoon seasons,

The eastern part of Juhu, which was completed before the monsoon of 1931, showed appreciable progress in consolidation after the monsoon and was fit for use at least by light aeroplanes during the dry season. In order to accelerate the process of binding the surface it is proposed to sow grass seed over the whole filled area at the beginning of the 1932 monsoon. The majority of the surface will then be fit for use during the ensuing dry season and it is hoped that to a large extent it will remain serviceable during the monsoon of 1933.

(4) *Calcutta-Rangoon Route*.—The Chittagong, Sandoway and Bassein landing grounds were completed during the year. Each of these landing grounds has been in part constructed by filling in from borrow pits. Here again the process of consolidation will take some time. After experiencing one monsoon the grounds remained fit for use during the dry season of 1931-32.

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

Karachi Air Port.—Additional rooms in the hangar and electric installation, extension of fencing, obstruction lights.

Hyderabad.—Garage for folding wing aeroplanes particularly for use in connection with the air mail service.

Delhi.—Oiled surface experimental area; grant made from the Petrol Tax Fund.

Allahabad.—Picketing base; office and quarters for staff, ambulance garage, retaining wall on south, grading and draining the N. W. corner of aerodrome.

Dum Dum.—Drains, provision of electric fans, obstruction lights.

Akyab.—Starting platform; while only a small area, this has been constructed so that it may be used for starting the run in taking off.

Rangoon.—Obstruction lights; additional rooms in the hangar.

Compass swinging bases have been constructed at Karachi, Delhi and Dum Dum.

The total amount spent on works services (including maintenance) during the year 1931-32 was Rs. 4,88,650.

(6) *Wireless Services*.—The civil aviation wireless stations are provided and operated by the Posts and Telegraphs Department, the cost including all overheads, being provided as a separate item in the Civil Aviation Budget (see "Administration" Section).

The retrenchment programme necessitated certain curtailments of the service, but, on account of the comparatively small reduction of expenditure which it is possible to achieve by laying up wireless stations and the fact that some of the stations have to be operated for other purposes, while achieving certain economies in operation, it was found possible to maintain the service on a skeleton basis adequate for the

needs of the present air services, and at the same time to complete and put into operation the partially completed stations on the Calcutta-Rangoon section.

In pursuance of this reorganisation programme, the following W/T communication and D. F. Stations were closed and will only be reopened when financial conditions permit :—

Delhi	.	.	.	.	.	.	.	D. F. station.
Allahabad	.	.	.	.	.	.	.	D. F. station.
* Gaya	.	.	.	.	.	.	.	W/T and D. F. station.

The following new stations on the Calcutta-Rangoon section were completed and put into operation by the 31st March 1932 :—

Chittagong	.	.	.	.	.	.	.	W/T only.
Akyab	.	.	.	.	.	.	.	W/T and D. F.
Sandoway	.	.	.	.	.	.	.	W/T only.
Bassein	.	.	.	.	.	.	.	W/T only.

Rangoon Aerodrome W/T and D. F. (Adcock system).

Victoria Point Radio is scheduled as an Aeronautical Wireless station and was used for the purpose by March 1932.

The provision of radiogoniometric stations at Chittagong, Sandoway and Bassein was deferred but it is hoped that this will be completed during the financial year 1933-34.

The completion of the W/T stations to their present stage will be a material help to the navigation of the difficult Burma coast air route during the monsoon, both to aircraft fitted with wireless apparatus and those which only benefit by more rapid communication between landing grounds. The navigation of this section should therefore be considerably safer during the monsoon of 1932 and, with the addition of the remaining D. F. stations, thereby rendering instrument flying more often possible, there will be a further improvement in safety in the 1933 monsoon.

During the year the completion of stations has made it possible to put the aviation wireless service on a regularly organised basis. Stations keep watch at certain fixed hours every day, thus providing through communication along the chain; all stations also maintain watch during the whole time that aircraft on scheduled services are within the zone of the station; special watches are arranged, on request, for special flights.

Communication has been opened with neighbouring States with a view to linking the Indian aviation wireless service with that of the adjoining countries.

The organisation for passing arrival and departure reports and weather reports and forecasts has been improved and extended.

* Communication with aircraft in flight between Allahabad and Calcutta and point to point communication is maintained by those two stations.

(7) *Meteorological Services.*—The meteorological service for aviation is organised by the Director General of Observatories and is not provided for in the Civil Aviation Budget.

Retrenchment involved certain curtailments of the service. Those which principally affected civil aviation were the closing of the Delhi and Rangoon forecasting centres, with the consequent concentration of forecasting for the trans-India route at two centres—Karachi and Calcutta. The closing of the Madras forecasting centre did not immediately affect civil aviation, but reduces the facilities available on the Karachi-Madras route for the air mail service which will commence operations in 1932; the meteorological office at Poona is now the only forecasting centre in South India. The broadcasting of meteorological data on short wave telegraphy from Karachi was also abandoned during the year. This latter had an indirect effect on civil aviation, in that the data had hitherto been received by Baghdad and Cairo.

While these retrenchments have taken place, the organisation for distribution of forecasts and weather reports has been consolidated and improved, and linked up more closely with the wireless service. Plans have been prepared for the regular distribution by wireless of current weather reports from all aerodromes and landing grounds on the trans-India route.

Further details of the meteorological services are given in handbooks published by the Director General of Observatories.

(8) *Air Pilot—India.*—An "Air Pilot" giving full details of all the ground organisation and services for civil aviation in India is in course of preparation and will be placed on sale during 1932.

APPENDIX I.
Regular Air Services to and from India.
AIR MAILS.

	TO INDIA.						FROM INDIA.	
	IMPERIAL AIRWAYS.		K. L. M.		AIR ORIENT.		IMPERIAL AIRWAYS.	
	Ordinary Mails.	Transit Mails.	From Europe.	From the East.	From Europe.	From the East.	Ordinary Mails.	Transit Mails.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1929, 9 months	21,967	16	..	..	..	..	20,171	485
1930, March quarter	8,329	108	..	..	..	..	5,995	464
" June quarter	9,990	97	..	..	..	..	7,288	608
" September quarter	9,517	67	12	..	..	..	9,308	734
" December quarter	11,528	87	84	..	..	..	11,424	755
1930, TOTAL	39,364	359	96	..	..	..	34,015	2,561
1931, March quarter	10,336	134	114	..	68	..	8,731	474
" June quarter	9,915	184	174	..	84	..	3,606	598
" September quarter	11,176	219	161	No record	124	No record	10,891	714
" December quarter	14,205	303	598	42	42	..	11,246	806
1931, TOTAL	45,632	840	1,047	No record	318	No record	40,474	2,592

APPENDIX II.

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

	Number of flights.	PASSENGERS.		FREIGHT.	
		To India.	From India.	To India.	From India.
		No.	No.	lbs.	lbs.
<i>Imperial Airways.</i>					
1929, 9 months	80	No record	No record	No record	No record
1930, Year	105	78*	70*	No record	No record
1931, March quarter	25	No record	No record	897	.. 30
" June quarter	27	18	32	1,292	19
" September quarter	26	29	26	1,470	264
" December quarter	26	33	16	1,830	
TOTAL	104	80	74	5,489	313
<i>Foreign services.</i>					
1931, March quarter	21	No record	No record	No record	No record
" June quarter	23	10	1	Do.	Do.
" September quarter	26	6	5	552	32
" December quarter	36	16	12	76	11
TOTAL	106	32	18	628	43

* Figures for the financial year 1930-31.

APPENDIX III.

Indian State Air Service (Karachi-Delhi).

Period.	AIRCRAFT FLIGHTS.			Aircraft mileage.	Passengers carried.	MAILS CARRIED.	
	Scheduled.	Completed.	Percentage.			Westbound.	Eastbound.
			Per cent.			lbs.	lbs.
1930, March quarter	26	26	100	17,940	44	417	571
" June quarter	26	26	100	17,940	40	392	778
" September quarter	26	26	100	17,940	29	603	1,028
" December quarter	26	26	100	17,940	15	699	1,263
TOTAL	104	104	100	71,760	128	2,111	3,640
1931, March quarter	26	26	100	17,940	26	603	1,454
" June quarter	25	25	100	17,250	34	1,453	1,362
" September quarter	27	20	74*	13,800	19	913	655
" December quarter	26	22	85†	15,180	29	770	1,085
TOTAL	104	93	89	64,170	108	3,739	4,556

* Part due to lack of technical stores; part due to unserviceable aerodromes.

† Due to delays on London-Karachi service.

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APPENDIX IV.

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.
			Rs.	Rs.	Rs.	Rs.
<i>Karachi.</i>						
1929	59	50	..	..	..	..
1930	70	64	1,29,382*	7,65,876*	4,150*	..
1931, March quarter	28	22	1,50,601	1,06,801	4,286	10,00,000
" June quarter	31	32				
" September quarter	27	25				
" December quarter	36	32				
TOTAL	122	111	1,50,601	1,06,801	4,286	10,00,000
<i>Rangoon.</i>						
1931, March quarter	10	15	Nil	Nil	Nil	4,54,790
" June quarter	14	16				
" September quarter	15	14				
" December quarter	18	20				
TOTAL	57	65	..	..	..	4,54,790

* These figures relate to the financial year 1930-31 and are partly duplicated in the figures for 1931.

APPENDIX V.

Summary of the work of the Flying Clubs in India.

Flying Club Centres.	MEMBERSHIP.			AIRCRAFT.		"AB INITIO" PUPILS WHO QUALIFIED FOR "A" LICENCE.		FLYING HOURS.		
	Total.	Flying Members.		No.	Type.	Europeans.	Indians.	Instruc- tion Hours.	Other Flying Hours.	Total.
		Europeans.	Indians.							
Delhi and United Provinces Flying Club.	505	93	65	5	D. H. 60 Moth	7	9	639	1,046	1,685
Cawnpore Centre										
Lucknow Centre										
Bombay Flying Club *	261	38	71	4	Ditto	9	10	922	1,162	2,084
Karachi Flying Club	162	33	57	3	Ditto	10	20	537	1,001	1,537
Madras Flying Club	270	18	11	2	Ditto	11	6	662	545	1,206
Bengal Flying Club.	352	98	44	1	Puss Moth . .	12	6	863	1,065	1,928
Punjab Flying Club †	330	38	205	3	D. H. 60 Moth	5	8	219	411	630
TOTAL	1,880	318	453	20		54	59	3,842	5,230	9,072

* Figures for November 1931.

† Figures for June 1931.

APPENDIX VI.

Accidents in India.

ANALYSIS OF CAUSES.

Type of flying and name of Flying Club.	ERROR OF PILOT.		Power plant failure.	Structural failure.	Weather.	Miscellaneous (Bad ground, darkness, etc.).	Undetermined.	Total.
	Licensed pilots.	Pilots under training.						
Indian Aircraft.								
Flying Clubs—								
Bengal	..	1	..	..	..	..	..	2
Bombay	3	..	..	..	..	..	..	3
Delhi	1	2	..	..	..	1	..	3
Karachi	3	..	..	..	..	..	..	4
Punjab	1	2	..	..	..	..	..	3
Madras	3	..	..	..	..	..	..	3
Cawnpore	..	..	..	..	..	..	..	..
Lucknow	12	5	..	..	..	1	..	18
TOTAL (INDIAN AIRCRAFT)								
Foreign Aircraft.								
Regular Air—								
Transport	..	..	..	..	2*	..	..	2
Casual flights	..	..	..	..	..	2†	..	2
TOTAL (FOREIGN AIRCRAFT)	..	..	..	..	2	2	..	4
TOTAL IN INDIA	12	5	..	..	2	3	..	22

* Bad visibility : one hit trees in flight ; one landed on bad ground and subsequently caught fire.

† One hit vulture in flight, forced landed on bad ground, turned over and caught fire ; one landed in rough sea and sank.

APPENDIX VII.

Accidents—Indian Aircraft.

ANALYSIS OF PILOT'S ERRORS.

	Licensed Pilots.	Pilots under Training.	Total.
(1) Bad landings	5	2	7
(2) Stall near ground	3	1	4
(3) Breach of Aircraft Rules—low flying	1	1	2
(4) Breach of Aircraft Rules—collision while landing.	1	..	1
(5) Collision with obstructions taking off	2	..	2
(6) Collision with obstruction landing (people)	1	..	1
TOTAL	13	4	17

APPENDIX VIII.

Major Accidents—Indian Aircraft.

	1930.	1931.
(1) Aircraft hours flown	7,542	9,070
(2) Aircraft miles flown (approx.)	527,940	646,800
(3) Accidents involving fatalities—		
(a) Crew	..	..
(b) Passengers	..	..
(c) Other persons	..	1
(4) Non-fatal accidents involving injuries—		
(a) Crew	..	..
(b) Passengers	..	..
(c) Other persons	..	..
(5) Number of killed—		
(a) Crew	..	..
(b) Passengers	..	..
(c) Other persons	..	1
(6) Number of injured—		
(a) Crew	..	..
(b) Passengers	..	..
(c) Other persons	..	1
(7) Miles flown per fatality	..	646,800
(8) Miles flown per injury or fatality	..	323,400

NOTE.—Major accidents only occurred in club flying and are compared only with the hours and miles flown in that class of flying.

APPENDIX IX.

List of Areas Surveyed by the Indian Air Survey and Transport Co., Ltd., in India and Burma.

Date of Photography.	Name of Survey.	Area photographed Sq. miles.	Scale of photography.	Object of Survey.
January—March 1924	Irrawaddy	1,400	3·4"=1 mile.	Topographical maps 3"=1 mile.
August 1924	Rangoon	50	8"=1 mile.	Town map 12"=1 mile.
November 1924	Yenangyung	50	3·5"=1 mile.	Topographical maps 3"=1 mile.
TOTAL		1,500		
January—April 1925.	Tennasscri Forests	15,000	4"=1 mile.	Forest stock mapping from 800 sq. miles of vertical photography, remainder from oblique photography and sketching from the air.
TOTAL		15,000		
January 1927	Chittagong Forest Survey	1,400	4"=1 mile.	Topographical maps with contours 4"=1 mile.
TOTAL		1,400		
January 1928	Orissa Coast	300	3·45"=1 mile.	Topographical maps with 3·45"=1 mile.
February 1928	Gumti River at Lucknow	10	5·2"=1 mile.	Mosaic 5·2"=1 mile.
February 1928	Bagirathi River	85	6·2"=1 mile.	Mosaic 6·2"=1 mile. Topographical map 4"=1 mile.
February—April 1928	Malda District, Bengal	800	8"=1 mile.	Cadastral maps 16"=1 mile.
March 1928	Chittagong Port Survey	110	6"=1 mile.	Mosaic 12"=1 mile.
September 1928	Hooghly River Survey	30	8"=1 mile.	Maps 16"=1 mile showing water line at full half tide level.
September 1928	Sone River	70	8"=1 mile.	Topographical maps 4"=1 mile.
September—October 1928.	Chenab River below Khanki	110	7·7"=1 mile.	Mosaic 7·7"=1 mile.
October—January 1928-29.	Sitapur District, United Provinces.	1,800	6"=1 mile.	Cadastral maps 16"=1 mile.
December 1928	Mourigram-Bally Survey	20	6"=1 mile.	Ditto.
December—January 1928-29.	Bahraich	800	6"=1 mile.	Ditto.
Ditto	Fyzabad	400	6"=1 mile.	Ditto.
TOTAL		4,535		
February 1929	Doocha River at Shah-jahanpur.	6	6·2"=1 mile.	Mosaic 6·2"=1 mile.
March 1929	Ganges and Jumna River at Goalundo.	116	4·8"=1 mile.	„ 4·8"=1 mile.
March 1929	Jumna River at Fulchari	114	5"=1 mile.	„ 5"=1 mile.
March 1929	Bhagula N. River at Dhaneta.	11	6·2"=1 mile.	„ 6·2"=1 mile.

APPENDIX IX—contd.

Date of Photography.	Name of Survey.	Area photo-graphed Sq. miles.	Scale of photography.	Object of Survey.
March 1929	Jumna River at Serajgunj and Jaganathgunj.	246	5"=1 mile.	Mosaic 5"=1 mile.
March 1929	Sardar River at Banbassa	27	5.4"=1 mile.	" 5.4"=1 mile.
March 1929	Ganges River at Garmukteswar.	25	6"=1 mile.	" 6"=1 mile.
March 1929	Ganges River at Rajghat	13	5.2"=1 mile.	" 5.2"=1 mile.
March 1929	Saloni River at Roorkee	10	6"=1 mile.	" 6"=1 mile.
March 1929	Ganges River at Balawal	17	6"=1 mile.	" 6"=1 mile.
March 1929	Ramganga River at Moradabad.	10	6"=1 mile.	" 6"=1 mile.
March 1929	Jumna River at Delhi	23	5.8"=1 mile.	" 5.8"=1 mile.
March 1929	Ramganga Weir at Seohora.	77	4.8"=1 mile.	" 4.8"=1 mile.
March 1929	Ramganga River at Bareilly.	10	6.1"=1 mile.	" 6.1"=1 mile.
March 1929	Ganges River from Sardar to below Pabna.	410	5.4"=1 mile.	" 5.4"=1 mile.
March 1929	Ganges River at Hardwar Weir.	44	5"=1 mile.	" 5"=1 mile.
March & April 1929	Dhaleswari River	150	4.6"=1 mile.	" 4.6"=1 mile.
March 1929	Sutlej River at Phillaur	32	6.2"=1 mile.	" 6.2"=1 mile.
April 1929	Ravi River at Lahore	39	6"=1 mile.	" 6"=1 mile.
April 1929	Chenab River at Rivaz Bridge.	54	5.8"=1 mile.	" 5.8"=1 mile.
April 1929	Chenab River at Chiniot	36	5.9"=1 mile.	" 5.9"=1 mile.
April 1929	Jhelum River at Kushab	36	5.7"=1 mile.	" 5.7"=1 mile.
April 1929	Victoria Bridge, Miani	28	5.9"=1 mile.	" 5.9"=1 mile.
April 1929	Jhelum River at Jhelum	52	5.7"=1 mile.	" 5.7"=1 mile.
April 1929	Chenab River at Wazirabad.	43	6"=1 mile.	" 6"=1 mile.
April 1929	Narowal	27	6"=1 mile.	" 6"=1 mile.
April 1929	Sutlej River at Gidarpindi	32	6"=1 mile.	" 6"=1 mile.
April 1929	Beas River at Dhillwan	24	6"=1 mile.	" 6"=1 mile.
April to May 1929	Sutlej River	400	4.7"=1 mile.	{ Topographical map 4"=1 mile. Mosaic 4.7"=1 mile.
April 1929	Sutlej River at Ferozepore	46	6"=1 mile.	Mosaic 6"=1 mile.
May 1929	Jumna River at Kalanour	25	6"=1 mile.	" 6"=1 mile.
May 1929	Junction of Jumna River and Dhaleswari.	46	5"=1 mile.	" 5"=1 mile.
September 1929	Indore City	20	10.6"=1 mile.	Town maps 16"=1 mile. Mosaic 32"=1 mile.
October 1929	Bhagarathi River	10	6.1"=1 mile.	" 6.1"=1 mile.
November 1929	Jumna River at Fulchari	110	4.7"=1 mile.	" 4.7"=1 mile.

APPENDIX IX—contd.

Date of Photography.	Name of Survey.	Area photo-graphed Sq. miles.	Scale of photography.	Object of Survey.
November 1929	Jumna River at Hargila	13.5	4.9"=1 mile.	Mosaic 4.9"=1 mile.
November 1929	Jumna River at Jaganathgunj.	57	4.9"=1 mile.	" 4.9"=1 mile.
November 1929	Jumna River at Serajgunj	16.5	4.9"=1 mile.	" 4.9"=1 mile.
November 1929	Jumna River Serajgunj to Dhaleswari River.	200	4.9"=1 mile.	" 4.9"=1 mile.
November 1929	Dhaleswari River	130	4.9"=1 mile.	" 4.9"=1 mile.
November 1929	Boutha River at Manikganj.	10	4.9"=1 mile.	" 4.9"=1 mile.
November 1929	Jumna River at Sadhuganj.	11	4.9"=1 mile.	" 4.9"=1 mile.
November 1929	Jumna River at Natakola.	7.5	4.9"=1 mile.	" 4.9"=1 mile.
November 1929	Ganges River at Pabna	7	4.9"=1 mile.	" 4.9"=1 mile.
November 1929	Jumna River at Goalundo	70	4.9"=1 mile.	" 4.9"=1 mile.
November 1929	Jumna River at Belgachi	11	4.9"=1 mile.	" 4.9"=1 mile.
November 1929	Ganges River at Bhatpara	8	4.9"=1 mile.	" 4.9"=1 mile.
November 1929	Ganges River at Sengram	7	4.9"=1 mile.	" 4.9"=1 mile.
November 1929	Ganges River at Tolbaria	9	4.9"=1 mile.	" 4.9"=1 mile.
TOTAL		2,926.5		
January 1930	Dum Dum Aerodrome	2	8"=1 mile.	Mosaic 16"=1 mile.
January and February 1930	Malda District, Bengal	800	6"=1 mile.	Cadastral maps 16"=1 mile.
February 1930	Bhutni Deral	40	6"=1 mile.	Ditto.
February 1930	Calcutta	45	8.75"=1 mile.	Mosaic 8.75"=1 mile. " 16"=1 mile. " 24"=1 mile.
March 1930	Bakrampur	600	6"=1 mile.	Cadastral maps 16"=1 mile.
April 1930	Bagarathi and Ganges Rivers.	600	4"=1 mile.	Mosaic 4"=1 mile.
May 1930	Champdany Municipality	5	10"=1 mile.	" 24"=1 mile.
November 1930	Gonda District, United Provinces.	500	6"=1 mile.	Cadastral maps 16"=1 mile.
December 1930	Kheri District, United Provinces.	550	Do.	Cadastral maps 16"=1 mile.
December 1930	Pilibhit District, United Provinces.	250	Do.	Cadastral maps 16"=1 mile.
December 1930	North Kheri Forest Divn.	16	Do.	Mosaic 4"=1 mile.
December 1930	Pilibhit Forest Divn.	14	Do.	Mosaic 4"=1 mile.
TOTAL		3,422		
January 1931	Rangpur District, Bengal	800	6"=1 mile.	Cadastral maps 16"=1 mile.
January 1931	Shahjahanpur	400	Do.	Ditto.

APPENDIX IX—*contd.*

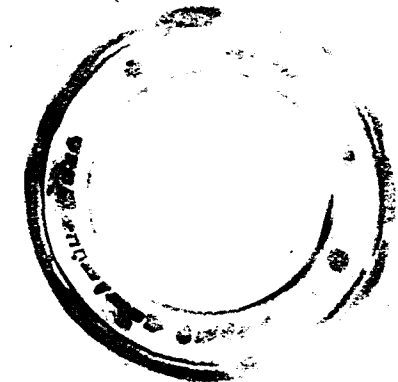
Date of Photography.	Name of Survey.	Area photographed Sq. miles.	Scale of photography.	Object of Survey.
February 1931 .	Ranchi District, Bihar & Orissa.	30	6"=1 mile.	Cadastral maps, 13"=1 mile.
February 1931 .	Bareilly	400	Do.	Ditto.
February 1931 .	Aligarh	150	Do.	Cadastral maps 16.76"=1 mile.
February 1931 .	Ramganga River at Seohora.	15	Do.	Mosaic 6"=1 mile.
February 1931 .	Ganges River at Hardwar	15	Do.	Mosaic 6"=1 mile.
May 1931 .	Zoological Gardens, Alipore.	0.5	20"=1 mile.	Map and Mosaic 52.8"=1 mile.
December 1931 .	Salvage Maldan, Durgapore.	2	26"=1 mile.	Mosaic 80"=1 mile.
December 1931 .	Rangpur District, Bengal	900	6"=1 mile.	Cadastral maps 16"=1 mile.
TOTAL .		2,712.5		
GRAND TOTAL (1924-31).		31,516		

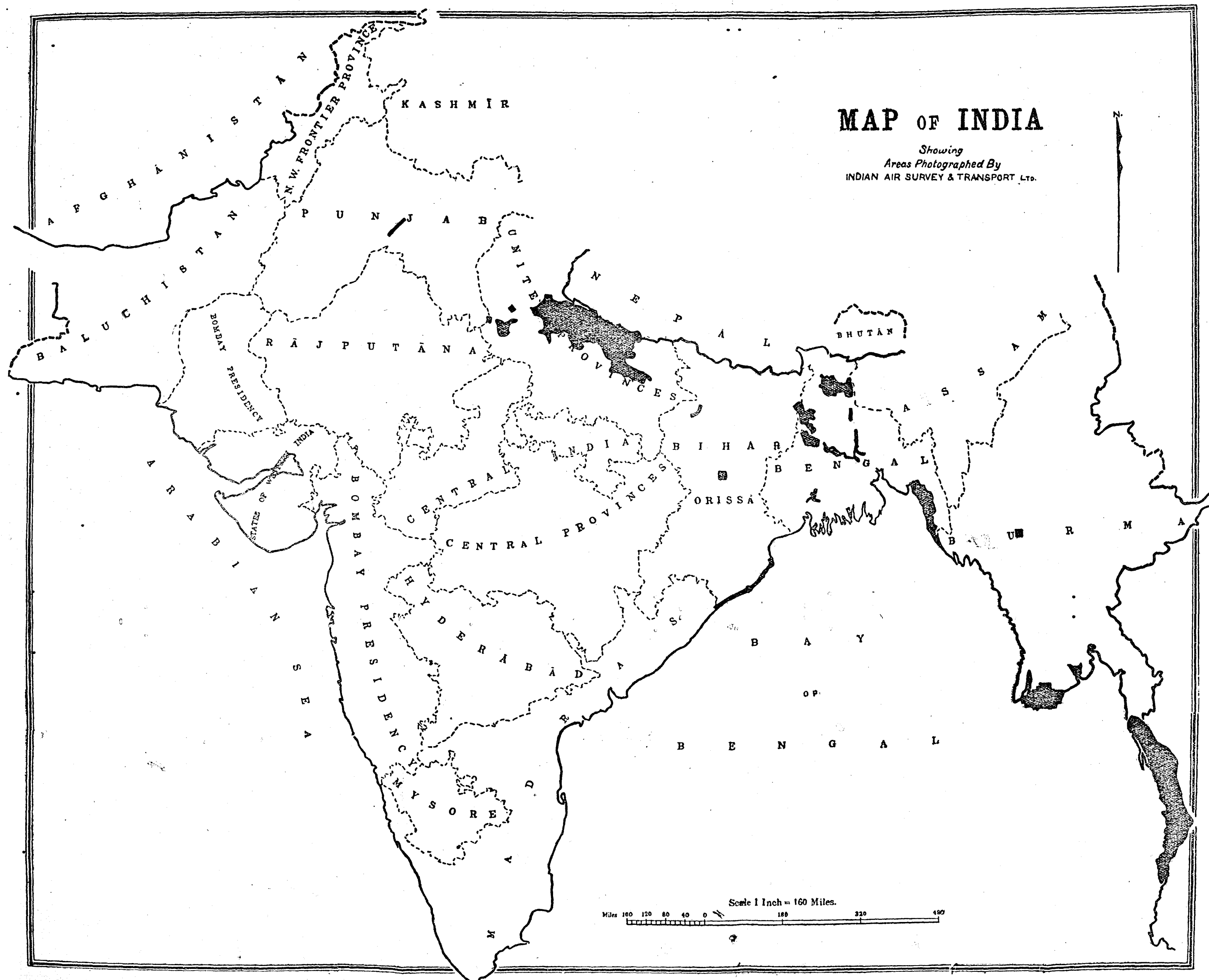
APPENDIX X.

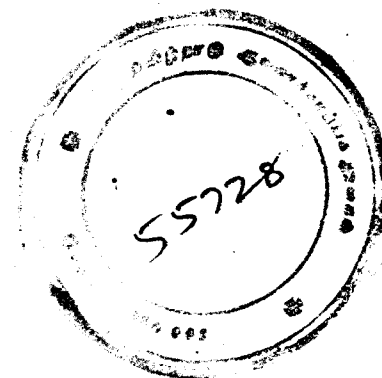
Licences and certificates issued and current during 1931 and previous years.

Licences and Certificates.	Issued.			Total to end of 1931.	Lapsed to end of 1931.	Current on 31st December 1930.	Current on 31st December 1931.
	Up to end of 1929.	During 1930.	During 1931.				
Pilot's 'A' Licences .	65	95	123*	283	86	125	197
Pilot's 'B' Licences .	36	29	18*	83	59	27	24
Ground Engineer's Licences.	24	7	9	40	21	11	19
Certificates of Airworthiness.	32	13	14	59	34	22	25
Certificates of Registration.	52	21	27	100	35	42	65

* The majority of 'A' licence Pilots were trained in India. Of the 18 'B' licences issued, two Indians were trained in India, and one European partially trained.







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