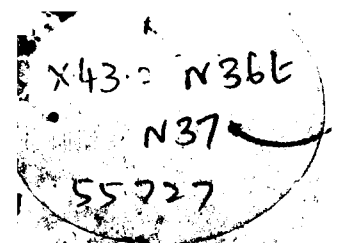


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India

1936-37



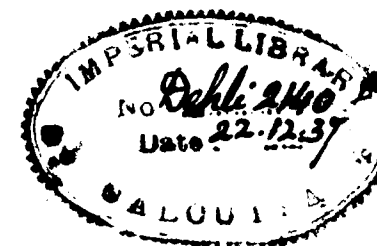
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1936-37



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**REPORT ON THE PROGRESS OF CIVIL AVIATION
IN INDIA, 1936-37.**

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MAPS.

Map showing air routes in India in operation and proposed, flying clubs, lighting facilities, prohibited areas, etc.	In folder at end of Report.
Map showing aerodromes and landing grounds of all categories in India and Burma	

INTRODUCTION.

NOTE.—Following the practice of previous years, this Report deals with events up to the 31st March 1937, but all statistical tables relate to the calendar year 1936. A separate section of the Report (Section VI) has been added this year to record the important progress made in the Indian States.

In 1911, a 50 H.P. aeroplane carried a 23 lb. bag of mail 20 miles at a speed of 50 miles an hour. In 1938, 3000 H.P. aeroplanes will carry $3\frac{1}{2}$ tons of passengers and mails with a crew of five more than half way round the world at a speed well over 150 miles an hour.

The year 1936 has been one of intensive planning for this next stage in the development of a British air transport system, while development in India has been arrested, the better to deal with the future. The picture of aviation in India must indeed be seen in a setting the feature of which is intensive planning—planning to extend the world's air transport system over its greatest obstacles. Nor has all been restricted to planning. Two years ago the South Atlantic was spanned by French and German companies. Last year the first strand of the net was stretched across the Pacific by the United States of America. Next, the North Atlantic will be flown by British and American companies.

The relative position of India cannot be shewn better than by a repetition of the tables given in the introduction to last year's Report:—

Mileage of Regular Air Routes.

Year.	Great Britain.	India.	British Commonwealth of Nations.	United States of America.	France.	Germany.
1933 .	11,670	5,180	32,670	47,687	21,450	17,228
1934 .	13,750	5,830	41,300	50,800	21,290	23,440
1935 .	18,739	6,395	53,291	52,461	24,451	22,291
1936 .	23,717	6,483	68,240	61,532	33,798	23,494

NOTE.—The mileage given is the mileage of the air routes over which services are operated by the countries named.

“ENSIGN” class air liner (from a model). Aeroplanes of this class will be operated on the England-India route jointly by Imperial Airways, Ltd. and Indian Trans-Continental Airways, Ltd.



Frontispiece—To face Introduction.

To these figures it may be added that the total mileage flown on the world's air routes in 1936 was 160,000,000 miles (approx).

British Regular Air Transport Services.

Year.	Miles flown.	Passengers carried.	Outward Air Mail (External).	Total Air Mails (Internal and external).
			Tons.	Tons.
1933 . . .	2,638,000	79,100	85	171
1934 . . .	4,557,000	135,160	122	250
1935* . . .	8,412,000	200,000	187	714
1936 . . .	9,584,000	236,300	325	977

* Revised figures.

Internal Regular Air Services—India and Burma.

Year.	Miles flown.	Passengers carried.	Mails carried.
			Tons.
1933 . . .	153,680	155	10·5
1934 . . .	345,771	757	21·3
1935 . . .	553,754	553	43·4
1936 . . .	496,539	349	49·4

Apart from these air transport developments, the main matters worthy of special mention are the continued development of the ground organisation on the air routes in India; the promulgation of the Indian Aircraft Rules, 1937, which came into force in March, 1937, and replaced the Indian Aircraft Rules, 1920; and a matter which is noted with satisfaction, that there was a notable reduction in major aircraft accidents, two deaths only being recorded during the year.

SECTION I.

COMMERCIAL FLYING.

A.—COMPANY ORGANISATION.

Three new companies were registered during the year, all with headquarters in Bombay, but none has yet started operations. Apart from this, the aircraft operating companies and the services operated remain substantially as in 1935 :—

Company.	Services or other operations.
Indian Trans-Continental Airways, Ltd.	Karachi-Singapore (operated jointly with Imperial Airways Ltd).
Tata Sons, Ltd.	(i) Karachi-Bombay-Madras. (ii) Bombay-Cannanore-Trivandrum (Seasonal).
Indian National Airways, Ltd.	Karachi-Lahore.
Indian Air Survey and Transport, Ltd.	Air Survey and air charter.
Irrawaddy Flotilla and Airways, Ltd.	(i) Rangoon-Mandalay. (ii) Rangoon-Yenangyaung. (iii) Rangoon-Tavoy.
Himalaya Airways, Ltd.	Hardwar-Gauchar (Irregular).
Air Services of India, Ltd.	Not yet started. (Services to Kathiawar).
Indian Aviation Development Co., Ltd.	Not yet started. (Services in South India).
Aero Trade and Transport, Ltd.	Not yet started.

There was no change in the non-Indian services operating across India; they were operated as hitherto by Imperial Airways Ltd., the K.L.M., and Air France.

B.—REGULAR AIR TRANSPORT.

1. General.

While the services operated remained the same, there was a general increase of traffic in 1936 —

Air mails to India increased from 49·8 tons to 61·2 tons. Air mails from India increased from 45·5 tons to 53·8 tons.

Air mails carried by the two Indian feeder services increased from 43·4 tons to 49·4 tons. This excludes the trans-India service which carries both Indian and transit mails.

Air passengers to India increased from 641 to 864; air passengers from India increased from 619 to 973.

This growth of traffic took place in services which were deliberately stabilised while the planning of the Empire Air Mail Scheme (to take effect at the end of 1937) proceeded.

In Appendix 11 will be found an interesting comparison of the traffic carried by all the services, expressed in ton-miles. For the benefit of the uninitiated it may be explained that the "ton-mile" is a measure of the work done and is obtained by multiplying the load carried in tons by the distance it is carried in miles (Thus 0.1 tons carried 1000 miles = 100 ton-miles). "Capacity ton-miles" represents the maximum work which can be done, i.e., the load-carrying capacity of the aeroplane multiplied by the distance flown. The load factor is the ratio of the actual work done (Traffic ton-miles) to the possible work (Capacity ton-miles). "Passenger ton-miles," "Mail ton-miles" etc., are self explanatory.

By the courtesy of the K. L. M., corresponding figures for the Amsterdam-Batavia service are incorporated in the table. It should be noted that the figures for Imperial Airways and Indian Trans-Continental Airways relate only to the Karachi-Singapore section of the route.

2. Imperial Airways, Ltd. and Indian Trans-Continental Airways, Ltd.

Throughout the year the trans-India service from Karachi to Singapore was operated twice weekly as a part of the England-Australia service, the final section of this route viz. from Singapore to Australia being duplicated by Qantas Empire Airways Ltd., on May 15th, 1936.

Croydon-Karachi Section.—Between Egypt and India the service was operated as hitherto by the Handley Page Hannibal type. On the Mediterranean section, there were a number of changes and developments. The loss of two flying boats—one of the Short Calcutta class and one of the later Short Scipio class, in July and December 1936 respectively, tended to dislocate the service which was maintained with difficulty. In the later part of the year, delivery of the new Empire flying boats—Short Canopus class—commenced. The first of these was put on the service on 4th January, 1937, and thereafter succeeding deliveries enabled the service to be improved and changes of schedule to be introduced. First the rail journey across Italy was eliminated and the flying boats flew *via* Marseilles. One or two all-air services were operated and the flying boats next took over the eastbound traffic from England to Egypt. Finally, the whole of the route between Southampton and Egypt in both directions was scheduled to be flown as

from the 8th February, 1937. Naturally with a new type of aircraft and new route problems, there were minor difficulties which still tended to delay the service; but it is a notable fact that a number of the new boats were launched, passed their flying tests and were delivered by air to Imperial Airways' base on the same day, which indicates an unusually high standard in the elimination of "teething troubles".

Following the introduction of the new flying boats the schedule was accelerated by one day on the 1st May, 1937. The dates of arrival and departure in India were not affected, but the Saturday departure from London, which had almost acquired the respect due to antiquity was sacrificed. The new schedule was as follows:—

London . . .	Dep. . .	Thursday.	Sunday.
Karachi . . .	Arr. . .	Monday.	Thursday.
Karachi . . .	Dep. . .	Wednesday.	Saturday.
London . . .	Arr. . .	Sunday.	Wednesday.

The weight of mails carried by Imperial Airways to and from India was 108.2 tons against 87.8 tons in 1935. The service having been stabilised throughout the year, the increase of 15% was naturally lower than hitherto.

Passengers carried to and from India were 450 and 569 compared with 455 and 528 in 1935.

For the reasons stated above, the punctuality of the service suffered considerably during the year. Of 105 scheduled services to India 43 were delayed as shown in Appendix 4. The delays occurred mainly in January, February and March when the first shortage of flying boats occurred. This was followed by four months punctual service, but again a shortage of aircraft upset the regularity of the service in August and punctuality had not been completely re-established by the end of the year. Of 105 westbound services 11 left Karachi late: three due to bad weather, three due to mechanical reasons, one due to late departure from Singapore, two due to no aircraft being available at Singapore and two due to no aircraft being available at Karachi. Complete information as to arrivals in London is not available.

Statistics will be found in Appendices 1, 2, and 4.

Karachi-Singapore Section.—No changes in the operation of this section occurred, except the consequential changes in time-table referred to above. Mileage flown increased from 580,000 to 769,000, due to the completion of duplication.

There was a substantial growth in traffic carried, due partly to general factors but largely attributable to transit traffic, which increased rapidly with the organisation and establishment of the Australian section of the route. Thus, passenger traffic increased by 20 % from 117,180 to 140,604 ton-miles, while mail traffic increased by 44% from 209,556 to 302,915 ton-miles.

The regularity of operation of the Karachi-Singapore section itself was good, though its punctuality varied with the operations on other sections. In fact, some of the delay occurring on other sections of the route was made up by means of night flying on the trans-India section, the partial completion of the route lighting being of material assistance. Night flying on the service amounted to 683 hours—about 10% of the total. Of 59 days' delay on 43 eastbound services arriving at Karachi five days were made up in the flight to Rangoon. Delays exceeding two hours actually occurring on the Karachi-Rangoon Section and their causes are shewn below:—

	Eastbound.	Westbound.
Weather.	9	5
Mechanical	7	5
Pilot not available	2	..
Aircraft not available	2	2
Aerodrome unserviceable	1	..
Accident	1	..
Unable to reach destination before dark and hence night stop at intermediate places	2	..
Total delayed services	24	12
Total services operated	105	105

The only incident of major importance which occurred during the year was the loss of "Athena" by fire at Delhi aerodrome at the end of September. The accident occurred while the engines were being started up, and was due to a cylinder of oxygen having been supplied in place of compressed air. Mails were destroyed but there were no injuries to personnel. Apart from the delay to the particular service, regularity was not affected.

For a short time a De Havilland 86 (Diana) was used on a part of the route, otherwise the service is still completely operated by four Atalantas. The two belonging to Indian Trans-Continental Airways ("Arethusa" and "Aurora") are the original machines which started on the service in 1933. They have each flown over 500,000 miles as have also the two Imperial Airways machines ("Atalanta" and "Artemis"), which however have done part of their flying on other routes. A great step forward from the passengers' point of view was the installation of new type seating which was completed during the year.

Statistics will be found in Appendices 5, 6 and 11.

Singapore-Australia Section.—No developments or incidents of importance affecting the trans-India service took place, except the duplication of the service through to Brisbane on May 15th, 1936.

Penang-Hongkong Extension.—A new service was inaugurated on a provisional basis in March, 1936, and has continued to operate regularly every week. The service connects with the main Australia service and is operated *via* Saigon and Tourane on a schedule which enables the journey from Calcutta to Hongkong to be done in four days:—

Calcutta . Dep.	Saturday	Hong Kong Dep.	Friday.
Penang . Dep.	Monday	Penang Dep.	Sunday.
Hong Kong Arr.	Tuesday	Calcutta Arr.	Monday.

Investigations and a reconnaissance flight have recently been carried out with a view to shortening the route, which would reduce the time by rather more than one day.

3. Foreign Air Services—K. L. M. and Air France.

Throughout 1936, the K. L. M. operated their twice-weekly service and Air France their weekly service across India under the same conditions as hitherto.

The K. L. M. used Douglas D.C. 2. aeroplanes and maintained a 3½-day schedule between Amsterdam and Calcutta. 103 services were operated to India and 104 from India. There was again a considerable increase in passenger traffic carried by the K. L. M. *viz.* 291 passengers to India, compared with 161 in 1935, and 385 from India, compared with 181.

This increase is principally due to the growth of the travel by air habit of which the K. L. M. were able to take full advantage by the provision of new machines of larger passenger capacity which could also offer the attraction of speed. Imperial Airways on the other hand using the same type of machines as before were faced with an increase in mail traffic. Their machines were thus generally booked to capacity and the company had no further seats to offer.

Although the K. L. M. only carry mails to India from certain countries and do not have the opportunity of carrying mails from Empire countries, there was again an increase of about 45% in the mails carried by them from Europe to India—from 7,111 lbs. to 10,338 lbs. There was however a considerable drop in the mails carried by the K. L. M. to India from the East—from 6,896 to 1,841 bs.—no doubt due to the duplication of the Qantas Empire Airways service from Australia to Singapore. The mails carried from India

remained negligible as the company only receive mails for carriage to countries not served by British services.

Air France still use the Fokker F. VII type of aeroplane but began to replace it by Potez 62 from the 18th March, 1936. There is still one Fokker F. VII in service. The operational schedule remained as in 1935—4½ days from Paris to Karachi.

The small quantity of mail which Air France used to carry from India for China and Japan fell off during 1936, due to the use of the new Penang-Hong Kong service operated by Imperial Airways.

Statistics relating to these services will be found in Appendices 1, 2 and 4.

4. Tata Sons, Ltd.

Throughout the year Tata Sons, Ltd., operated the air mail service on a twice weekly basis from Karachi to Madras, and with the exception of the monsoon period the Bombay-Trivandrum service was operated on a weekly basis.

Negotiations have been completed with the three Indian States concerned for the operation of a twice weekly service between Bombay and Delhi *via* Indore, Bhopal and Gwalior. This it is intended to commence after the monsoon of 1937.

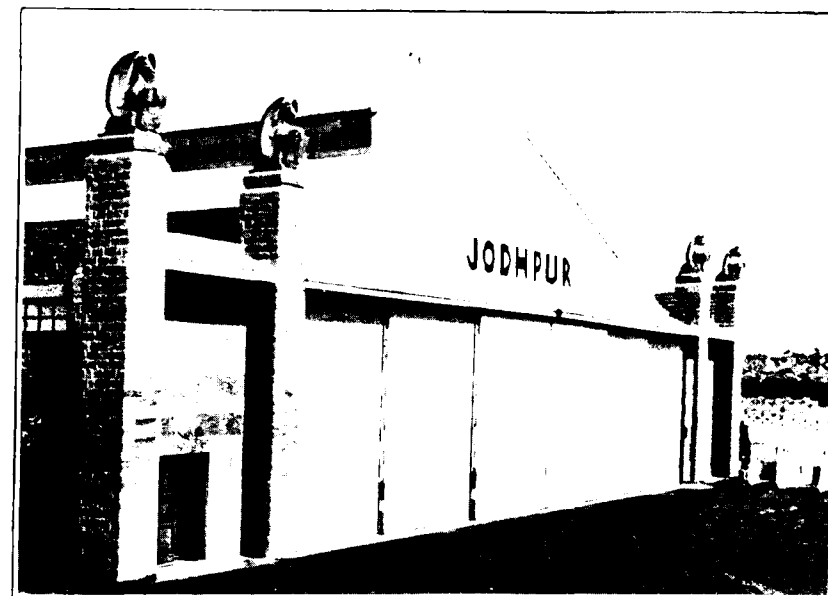
The total mileage flown by Tata aircraft on scheduled services in 1936 reached 341,000 miles—an increase of 13% over 1935. Total mail ton-miles reached 33,000—an increase of 21% over 1935.

The company's fleet was augmented in November by the purchase of a Waco C6, followed by further orders for this type. This is a single engined biplane powered with a Jacobs L. 4, 225 H.P. engine. It carries a pilot and four passengers (or a pay load of about 750 lb.) at a cruising speed of 140 m.p.h.

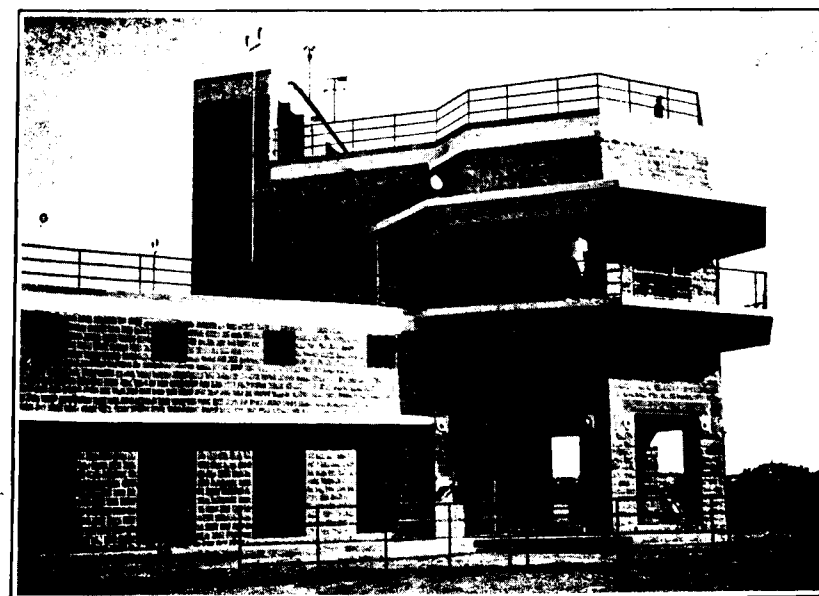
The personnel and fleet employed by Tata Sons at the end of the year is given in Appendix 12. A remarkably high degree of Indianisation was attained: 75% of the flying staff, 95% of the engineering staff and 92% of the administrative staff were Indians. The three senior Indian pilots have now between them flown over 7,000 hours in the Tata services.

As a demonstration intended to arouse public interest for a regular air mail service between Madras and Colombo, Tata Sons, Ltd., arranged for a special demonstration flight to carry, free of charge to the post office, surcharged Christmas mails to and from Ceylon in December, 1936. Owing to the delayed arrival of the eastbound Imperial Airways aeroplane, Tatas had to send out a special machine to Colombo on 23rd December, 1936, carrying internal mails from India to Ceylon. This machine returned to

To face page 6.



JODHPUR AERODROME, constructed by the Jodhpur State.—
One of the hangars.



JODHPUR AERODROME.—The control building.

Madras next morning with westbound mails from Colombo, and thus the first air mails from Colombo to the United Kingdom and the Continent were carried by the Tata air mail to Karachi on Christmas Day, 1936. The delayed southbound air mail for Ceylon brought by Imperial Airways was similarly carried by another machine to Colombo on the 24th December, 1936. Approximately 162 lbs. of mail was carried from Ceylon in the westbound direction and 139 lbs. in the eastbound direction by this service. This goodwill flight by Tatas created considerable interest in Ceylon, and a regular extension to Ceylon has been arranged from the date of commencement of the Empire Air Mail Scheme.

Karachi-Madras Service.—There was no change of major importance in the operational schedule of the service which continued *via* Hyderabad, and, during the monsoon, again called at Poona instead of Bombay. Although runways have now been provided at Juhu, it is not intended immediately to fly *via* Bombay during the monsoon. The crossing of the Western Ghats during bad weather needs a full wireless organisation. The ground wireless stations are being installed and the new fleet to be provided for the Empire Air Mail Scheme will also be equipped with wireless. After a period of operational experience with this organisation, the service will be scheduled *via* Bombay throughout the year.

A high standard of regularity was maintained ; only two services out of 210 were not completed *i.e.* 99·1% regularity. The two uncompleted services were : one a northbound service in June, 1936, which was not completed due to forced landing at Viramgam and the other a southbound service in October, 1936, which was cancelled at Poona due to bad weather.

Apart from these two services there were only three delays arising on the route. These were due to : weather 1 ; mechanical failure 2. Connection with Imperial Airways' westbound aeroplane at Karachi was effected on every occasion ; 43 southbound services were delayed due to the late arrival of Imperial Airways' eastbound aeroplane.

The mail loads carried north and south were remarkably equal. The total at 36·1 tons represents an increase of 16% over the 1935 total of 30·2 tons, and since the service and the postal conditions remained stabilised this figure is of some interest.

Passenger carrying is still a subsidiary object, but at the end of the year the company were able to offer two seats on the Bombay-Madras section and one seat on the Karachi-Bombay section. The total number of passengers increased from 40 to 69.

Operational statistics will be found in Appendix 7.

Bombay-Trivandrum Service.—This service was again operated on a weekly basis from January to April and from October to December, and continued through the dry season of 1937. 51 services were operated in 1936 with 100% regularity. Aircraft mileage reached nearly 40,000 miles. The service is operated mainly with Miles Merlin aircraft and runs in conjunction with one of the Karachi-Bombay services. Traffic remained light at 29 passengers and 214 lbs. of mail.

Operational statistics are given in Appendix 9.

5. Indian National Airways, Ltd.

The scheduled operations of the company were limited to the Karachi-Lahore air mail service. Apart from the two Government aircraft, referred to elsewhere, Indian National Airways maintained a fleet of :—

- 2 D. H. Dragon
- 2 D. H. Fox Moth
- 2 Percival Gull
- 1 Avro X

Of these, two Percival Gulls and one D. H. Fox Moth are used on the Karachi-Lahore service, while one D. H. Dragon is held in reserve for heavy loads.

It is of interest to record the composition of the company at the end of 1936. The staff employed included 83·3% of Indians, as shown in Appendix 12. Out of an authorised capital of Rs. 30 lakhs, Rs. 11·6 lakhs is paid up, and of this 87·6% is held by Indians. There are altogether 984 shareholders of whom 91·4% are Indians. The minority of Europeans who hold seats on the Board of Directors are all closely associated with this country. The Managing Agents are Messrs. Govan Bros., Ltd., of New Delhi.

The company holds 25% of the shares of Indian Trans-Continental Airways, Ltd., and acts as principal agents for Imperial Airways and Indian Trans-Continental Airways in India and Burma. For this purpose it maintains a traffic manager in Calcutta and a special traffic staff at Jodhpur, Delhi, Cawnpore, Allahabad, Calcutta and Akyab. During 1936 the organisation handled 961 passengers, of whom 534 were booked through the company. As hitherto, the company maintains a charter organisation at Delhi, and, in conjunction with Indian Air Survey and Transport, Ltd., at Dum Dum. Details are given under Miscellaneous Flying.

Karachi-Lahore Air Service.—209 services were operated during the year 1936 with 100% regularity, and connection was made with Imperial Airways at Karachi on every occasion. To achieve this and to give a morning delivery of the mails in Lahore and an afternoon departure, it was necessary to do 435 hours' night flying, i.e. about 25% of the whole scheduled flying. This, in view of the fact that the route has not yet been organised for night flying, is a highly commendable record.

43 northbound services were delayed due to the late arrival of Imperial Airways. Five other services were delayed, four due to weather and one to mechanical defect.

In January, 1937, the company suffered its first fatal accident since the inauguration of the service in December, 1934. The pilot was killed, but all mails with the exception of two or three letters, were salvaged. Every effort to trace the cause has failed. In the absence of any evidence of failure on the part of the engine or aircraft or of the pilot, it can only be attributed to some such cause as striking a vulture which put either the controls or the pilot out of action before he was able to effect a landing.

The mails carried in 1936 shewed an increase of 12·6% over 1935—14·1 tons compared with 11·5 tons in 1935. Passenger and freight traffic remained negligible. Operational statistics are given in Appendix 8.

Of the subsidy of Rs. 1,12,000 which was granted to Indian National Airways in 1936-37 for the operation of this service and the maintenance of the two Government aeroplanes, Rs. 44,000 was estimated to be due to the Karachi-Lahore service. The amount of subsidy actually paid was made dependent on the mail revenue earned on the Karachi-Lahore service, and as a result of the increased mail loads the subsidy was reduced by approximately Rs. 17,000. To maintain the company in existence until the start of the Empire Air Mail Scheme, the payment of the subsidy was again authorised in 1937-38.

6. Irrawaddy Flotilla and Airways, Ltd.

During the year the following services were operated without subsidy or mail contract :—

- (1) Rangoon to Mandalay (via Prome or Yenang-yaung) Once weekly.
- (2) Rangoon to Yenangyaung (via Prome) Twice weekly.
- (3) Rangoon to Tavoy (via Moulmein) Once weekly.

Owing to paucity of traffic the services are advertised as liable to cancellation in the absence of bookings. At one time the services were suspended due to lack of aircraft through accidents. The actual number of services operated and load carried on each service was :—

	No. of services.	Mileage.	Passengers.	Freight.
Rangoon-Mandalay	34	23,677	129	..
Rangoon-Yenang-yaung.	50	28,297	91	20
Rangoon-Tavoy	7	3,440	29	..
	91	55,414	249	20

Operational statistics are given in Appendix 10. The company report that the services continue to operate at a heavy financial loss. As the oldest transport company in Burma and one which carries all the heavy river traffic in Burma they have, however, continued to explore the possibilities of internal air transport. European companies have shewn a ready disposition to support the enterprise, but the Burmese have apparently found air travel too expensive. Nevertheless, there are definite signs of a growing disposition to adopt air travel. For example, there was a considerable increase in passengers in the early months of 1937—87 in March.

The company's operations were considerably hampered by a series of accidents, mostly due to damaged floats through striking submerged objects, a type of accident which is inevitably associated with pioneer operations. The Fox Moth seaplane twice suffered such an accident in the monsoon period, on each occasion buckling float struts. Finally in November, 1936, a similar accident resulted in the aeroplane being submerged and extensively damaged during salvage. In April, the Short Scion Senior, which was put into service in February, crashed in the Inle lake when making a pioneer flight to the Shan States. The accident was attributed to violent down currents from the mountains bordering the lake, while the pilot was circling preparatory to landing.

Special charter flights included one to the Andaman Islands in April, 1936, in the Short Scion, and a special delivery of His Excellency the Viceroy's mails to Yenangyaung. Particulars of charter flights are included under Miscellaneous Flying.

In November, 1936, a second Scion Senior was delivered and the services were maintained with this machine thereafter.

C.—MISCELLANEOUS FLYING AND COMMERCIAL ACTIVITIES.

1. Air Survey—Indian Air Survey and Transport, Ltd.

Indian Air Survey and Transport, Ltd., are the oldest established aircraft operating company in India, and the importance of the successful air survey work which they carry out year after year merits the premier place amongst the miscellaneous aviation activities in India.

Two De Havilland Leopard Moths specially modified and equipped for air survey photography were employed. The total flying amounted to 299 hours, of which 255 hours was spent on air survey photography. The total area photographed amounted to 3,028 square miles, 700 square miles of which were for the revision of cadastral maps.

Out of a total of 1,600 square miles of survey for geological purposes, 600 square miles were surveyed in the Karenni States, Burma. The photography of this area was carried out at 3" to the mile and photographic plans and stereoscopic pairs of photographs were supplied. The towns of Jamshedpur and Delhi were photographed on a large scale for town plan revision, while Cawnpore, Lahore and Rewa were also photographed vertically, and in addition numerous orders have been completed for oblique photography for various purposes in many parts of India.

In the Drawing and Map Section a total area of 3,242 square miles has been processed, details of which are as follows :—

Ajmere	16.5 sq. miles ; maps compiled on a scale of 32" to the mile and 6" to the mile.
Dinajpur Dt., Bengal	1,091 sq. miles ; 6" mosaics and 16" to the mile rectifications.
Batanagar	4 sq. miles ; photographic plan at 16" to the mile.
Irrigation Headworks at Marala, Punjab.	100 sq. miles ; mosaics at 3" to the mile.
Jhelum, Punjab	90 sq. miles ; mosaics at 3" to the mile.
Kanki Headworks, Chenab river.	90 sq. miles ; mosaics at 3" to the mile.
Lahore town	7.8 sq. miles ; Guide map at 3" to the mile.
Arial Khan river	312 sq. miles ; mosaics at 3" to the mile.

This completes 165 surveys by vertical photography, totalling 41,000 square miles in India and Burma, since the commencement of operations by this company.

Reference to previous reports will show that Indian Air Survey and Transport have been steadily employed for some years on

large scale photography and mapping for land settlement work (mainly in Bengal and the United Provinces) and town planning. All the land settlement surveys and some of the others are carried out in conjunction with the Government Survey Departments, who provide the ground control and produce the maps, while the company provide rectified and scaled photographs. Certain other large scale surveys have been completed throughout to the finished map by the company. The success of this work is a matter of considerable technical importance, and the following note by the Surveyor General of India, which describes the methods employed and the results, is therefore of interest.

"Large scale maps were first produced in India, by air-survey methods, in connection with Settlement Surveys in Bengal. The plots were made by the radial line method, applied to enlargements on the scale of 16 inches to a mile from photos on the 6 inch scale. The first maps thus produced were unsatisfactory, the failure being due, not to any defects in flying or photography, but solely to inexperience of Indian Air Survey and Transport, Ltd. and the Survey of India.

"In spite of this set-back, the Bengal Government, on Survey of India advice, decided to proceed with air survey in connection with settlement work. As all the areas concerned were flat, it was realized that the radial line method of compilation was unnecessary and that with good flying it would be possible to scale and rectify individual photographs to fit the plotted ground control. Rectified enlargements were made quite successfully by projection of negatives, with control post-pointed on them, on to the ground control as plotted on zinc-mounted bromide paper. The maps produced by tracing from these enlargements were tested in the field and found quite satisfactory, with the result that the Bengal Government has since produced all its settlement maps by this method. Similar work has also been done for the U. P. Government with Survey of India co-operation as regards control.

"The Survey of India has not been connected with this work of recent years, but they were consulted at the time when the first successful maps were produced and were quite satisfied with all the technical work of Indian Air Survey and Transport, Ltd. and with the completed maps.

"The Survey of India has since been associated with the company in the survey of three large towns, Indore, Nagpur and Jamshedpur. 16-inch maps have been published by them of the two former, and maps of the last are now being drawn. In these cases, the Survey of India has been perfectly satisfied with the flying and with the scaling and rectification of the photographs to the ground control fixed by the Department.

"It must be made quite clear that experience in India has been limited to large scale maps of "flat ground", i.e., ground which has no changes of level, within any individual photograph, sufficient to prevent straightforward scaling and rectification of the whole of the effective area of each photograph to fit the ground control, or to cause embarrassing distortion of any kind. It must also be understood that a good deal of ground work is always necessary, due to the necessity of filling in detail obscured by trees, etc., interpreting doubtful points and making sure of doubtful ground plans of buildings. It has never been necessary, however, to do any ground work owing to indifferent photographs or general shift of detail with reference to fixed control, which means that flying, photography and rectification of photographs to control have been quite satisfactory.

"Briefly, the method employed has been as follows—omitting details as regards cameras, lenses and flying.

"*Indore*.—Post-pointing of control was first done in the field by the Survey of India on contact prints, and subsequently transferred to the negatives. Scaling and rectification were carried out by projection of the image, so that the post-pointed control coincided with the control plotted on the enlarged scale of field work (32 inches to the mile) on bromide paper previously mounted on zinc. Field work was done by inking up on these enlarged and rectified photos, which were afterwards bleached out, so that only the line work could be photographed for drawing blue prints for the final map, on the scale of 16 inches to a mile.

"*Nagpur*.—Modifications of the above were introduced in that field work was done in the scale of mapping (16 inches to the mile) and on blue toned photographs. This did away with the necessity for bleaching and gave more satisfactory 'originals' for record, in that line work and photography were both retained.

"Undoubtedly, even with a considerable amount of ground work—the amount of which would tend to decrease as confidence is gained—this form of air-cum-ground survey of towns, on medium scales (such as, say, 25 inches to a mile) is, in India, very satisfactory and far cheaper than ground survey alone. It should however be noted that no standard of accuracy has been laid down for these town maps, which have been prepared for town planning and general purposes, and not in connection with property rights.

"We have no experience in India of revision by air survey of existing maps. The weather problem has not affected us in India because we have always been able to choose the best time of year for photography. Hence we have no experience of the effect of bad weather on photography and flying.

"With regard to strip-flying, the Survey of India has utilized photographs taken by Indian Air Survey and Transport, Ltd., to make maps on the 1-inch scale of a considerable area of country. This work was an extremely severe test of ability in strip-flying, as the strips were long and the country consisted entirely of low jungle covered hills, with practically no landmarks. In this case as in all others, the resulting photographs were quite satisfactory and both the fore and aft and lateral overlaps asked for were provided."

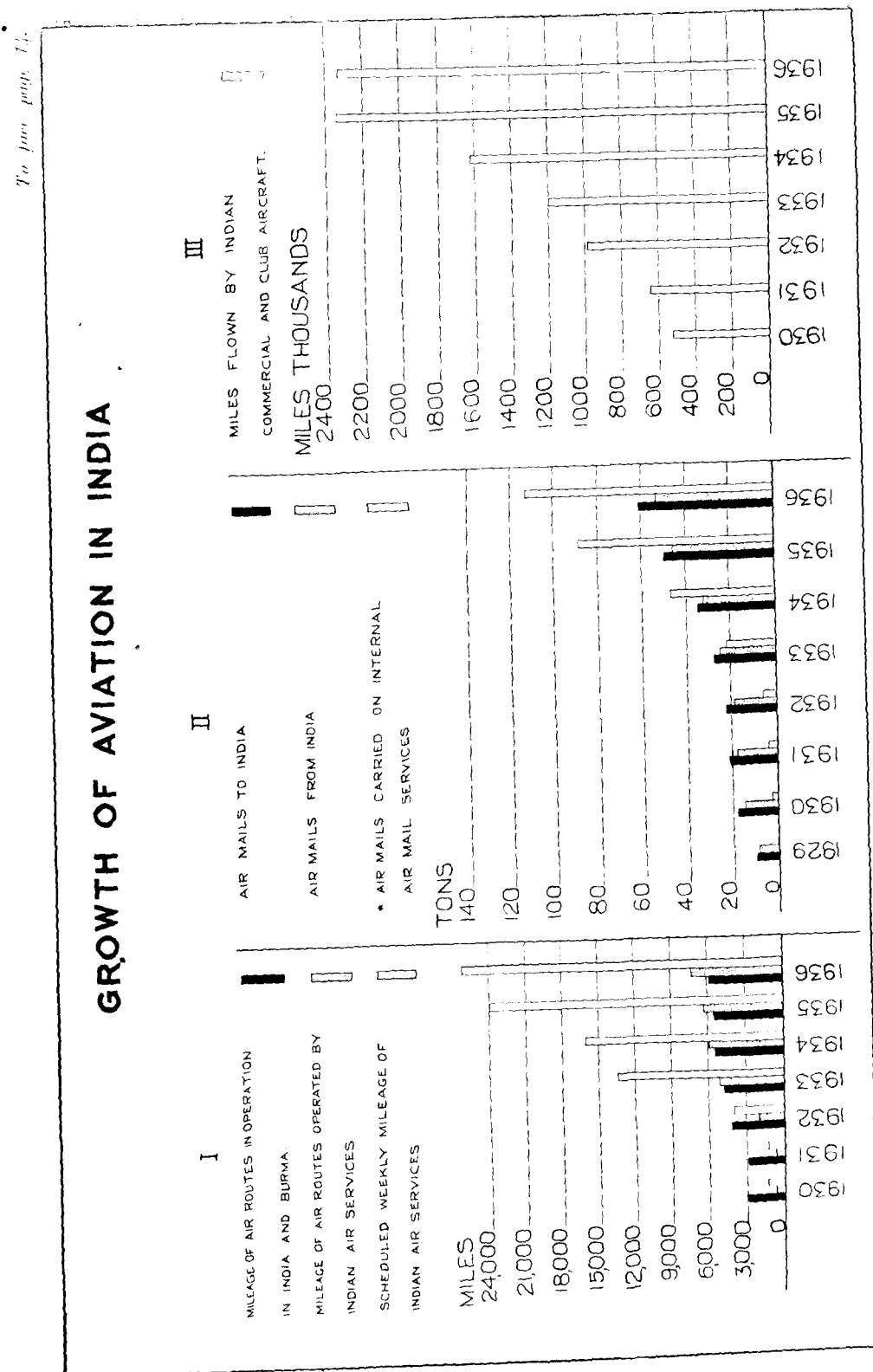
To complete the activities of Indian Air Survey and Transport, Ltd., their aircraft flew a total of 44 hours on charter work in conjunction with Indian National Airways, Ltd. Their personnel flew an additional 41 hours for demonstration, test and instruction on clients' aircraft; and they report a substantial increase in servicing and maintenance work, including the erection and test of one D.H. Dragonfly, one Tiger Moth and one Waco C6.

The company continued to operate and maintain the Bengal Government's Fox Moth ambulance aeroplane which flew a total of 39 hours during the year.

2. Non-Regular Air Transport.

The operations of Irrawaddy Flotilla and Airways, Ltd., have this year been transferred to "Regular Air Transport" since their services are operated on a published schedule whenever there are bookings. The table below shows the amount of charter or taxi flying carried out by all companies, including those whose regular operations have been dealt with elsewhere, and by flying clubs whose flying training and general club flying are dealt with in Section II.

Indian National Airways, Ltd., conducted some noteworthy charters during the year under review. Besides taking the President of the Indian National Congress on his election tour in the Punjab, they conveyed in a Dragon Moth a party which included the Chief Engineer of the United Provinces and the Commissioner of Meerut on an air tour of inspection of the Ganges Grid Tube Well Scheme. The flight covered 450 miles and was conducted mostly at 1,000 feet, from which height the index numbers on the roofs of the well kiosks were clearly visible. The party started on the morning of the 28th January and returned the same evening, thus accomplishing in a few hours an inspection which ordinarily would have taken days to complete. On another occasion, in February, 1937, one of their machines was chartered from Calcutta for a trip along the eastern coast *via* Madras to Ceylon. After stopping three days in Ceylon the flight was continued to Bombay, along the western coast, and then to Delhi.



Himalaya Airways, Ltd., limited its operations on the Hardwar-Gauchar route to a few flights only during May and June. In July, 1936, one of the company's aircraft met with an accident while landing at Agastmuni, the pilot and passenger being injured. As a consequence and in consideration of the limited dimensions of the ground the licence for it has been suspended in the interests of public safety pending further examination. Statistics of flying and traffic on the service are included in the following figures of non-regular air transport.

Non-Regular Air Transport.

Company or Organisation.	Journeys.	Hours flown.	Miles flown.	Passengers.
*Indian National Airways, Ltd.	54	552	57,057	176
†Tata Sons, Ltd.	Not known	215	19,659	13
‡Himalaya Airways, Ltd.	260	265	26,748	79
§Irrawaddy Flotilla and Airways, Ltd.	57	218	7,545	79
Aeronautical Training Centre of India.	5	13	1,310	3
Flying Clubs	35	335	28,130	51
Total 1936	411	1,598	140,449	401
Total 1935	1,228	3,232	262,248	1,483

* Including Indian Air Survey and Transport Ltd., (44 hours).

† Mainly test flights, which accounts for the small number of passengers.

‡ Includes demonstration and complimentary flights.

§ Excludes flying on scheduled air services included in this table last year.

There was a considerable decrease in charter flying in 1936, owing partly to the reduction of aircraft available for charter operations and partly no doubt to the fact that many among the richer classes, mainly Indian princes, have purchased aeroplanes of their own for their regular use, instead of chartering aeroplanes from the abovementioned companies or clubs.

3. Joyriding.

The following table shows the amount of joyride flying carried out by all companies and flying clubs.

Flying is no longer a novelty in most parts of India and as no flying organisation tapped any centres fresh to aviation, it could hardly be expected that joyriding would show anything but a decrease.

Joyride flying.

Company or Organisation.	Flights.	Hours flown.	Passengers.
Aeronautical Training Centre of India	23	17½	23
Indian National Airways, Ltd.	31	5½	85
Irrawaddy Flotilla and Airways, Ltd.	192	37	681
Himalaya Airways, Ltd.	1,005	132	2,918
Flying Clubs	Not known	227	1,586
Total 1936	1,251	419	5,293
Total 1935	3,460	796	13,047

4. Government aircraft.

As noted on a previous page, the Bengal Government ambulance Fox Moth was maintained in service under contract with Indian Air Survey and Transport Ltd. and was flown 39 hours.

The value of the machine for conveying immediate aid in times of distress was demonstrated again on 14th July, 1936, when it was allowed by the Government of Bengal to be used by Messrs. Andrew Yule and Co. Ltd., Calcutta, to carry medical relief to the victims of the Podih Colliery disaster at Asansol. A doctor, a nurse and medical stores were picked up at Alipore aerodrome and were landed at the scene of accident within 2½ hours.

His Excellency the Viceroy's Avro 642—the "Star of India" and the Government of India Avro X were maintained and operated throughout the year by Indian National Airways Ltd., at Delhi.

The total flying done by the "Star of India" was 101 hours, of which 12 hours were test and practice flights. The following flights

were made in the "Star of India" by Their Excellencies the Viceroy and the Countess of Willingdon:—

20th January, 1936	Porbandar to Delhi.
11th March, 1936	Delhi-Jaipur-Delhi. (Her Excellency the Countess of Willingdon).
17th March, 1936	Delhi-Jodhpur-Delhi.

Details of flights in the "Star of India" by special permission of His Excellency the Viceroy during 1936 are as follows:—

		By
22nd March, 1936	Delhi-Jaipur-Delhi	His Highness the Maharaja of Jaipur.
22nd October, 1936	Lahore-Karachi-Delhi	The Hon'ble Member, Home Department.
15th November, 1936	Karachi-Quetta-Karachi.	His Excellency the Commander-in-Chief of the East Indies Station.
22nd November, 1936	Karachi-Delhi	Ditto.
29th November, 1936	Delhi-Karachi	Ditto.

The Avro X made flights with officials totalling 103 hours. Details of the flights are given below:—

Month.	Tour.	By.
April, 1936	Delhi-Calcutta-Rangoon Victoria Point-Delhi.	Director of Civil Aviation.
October, 1936	Delhi-Cawnpore-Delhi	Offg. Chief Inspector of Aircraft.
November 1936	Delhi-Trivandrum-Delhi (D. H. Dragon substituted at Jodhpur).	The Hon. Member, Industries and Labour Department.
December, 1936	Delhi-Bareilly-Delhi	Director of Supplies and Transport, A. H. Q.
January, 1937	Delhi-Rangoon-Delhi	Director, Intelligence Bureau.
March, 1937	Delhi-Karachi-Delhi	Deputy Director of Civil Aviation.
March-April, 1937	Delhi-Quetta-Delhi	Quarter-Master General in India.

In addition, the Avro X was used by the company for 92 hours' flying on private charter work which is included in "Non-Regular Air Transport" on a previous page.

5. Sales and Service Organisation.

An increasing number of firms was engaged in the business of selling aircraft and spares.

De Havilland Aircraft Co., Ltd., Karachi.—The company report a considerable increase in the number and value of aircraft, engines and spares sold. The total sales amounted to Rs. 4.11 lakhs compared with Rs. 2.42 lakhs in 1935. Of the total, Rs. 3.03 lakhs represents complete aircraft, which comprised :—

- 1 Dragon Rapide.
- 2 Dragonfly.
- 3 Leopard Moth.
- 4 Tiger Moth.
- 1 Hornet Moth.

The company maintains a Hornet Moth for its own business tours and demonstration, and a small technical staff which undertakes overhaul and servicing of aircraft and engines.

Indian Air Survey and Transport, Ltd., Dum Dum.—This company acts as a sub-agent to the De Havilland Aircraft Co., Ltd., for the eastern part of India.

R. K. Dundas Ltd., New Delhi.—This company has its Indian Branch at the Delhi Aerodrome. It deals in aircraft, aircraft accessories and technical equipment. Sales during the year 1936 amounted to about Rs. 21,400 on spares, including wireless and sundries, and Rs. 92,900 on aircraft and aero-engines, as against Rs. 14,200 and Rs. 26,800 respectively during the year 1935. The company possesses an Airspeed Courier and its personnel consists of a European and three Indians.

A. R. Haseler, Bombay.—The company deals in spares and stores for various types of aircraft and has largely increased the variety of its stock by adding about 250 stock lines. The increase in sales during the year 1936 over that of 1935 was about Rs. 6,700.

Indian Aviation Development Co. Ltd.—Mr. R. Vaughan Fowler, now managing director of Indian Aviation Development Co., Ltd., was during the year 1936 dealing in his personal capacity in aircraft and aircraft spares. Imports included six B. A. "Swallows" fitted with Caters Mark II engines, and two B. A. "Eagles" fitted with Gipsy Major engines. The spares organisation was arranged through Aero Stores of Karachi.

6. Imports of aircraft and aircraft material.

The import trade in aircraft, aircraft parts and accessories has increased by more than Rs. 6 lakhs during 1936 and now stands at Rs. 14 lakhs, an index to the progress being made with the use of

aircraft in this country. A comparison with the figures for previous years is given below.

Year.	No. of aircraft imported.	Value of aircraft imported.	Value of aircraft parts, etc. imported.	Total value of aircraft and aircraft parts imported.
		Rs.	Rs.	Rs.
1934 . . .	32	4,06,140	4,02,425	8,08,565
1935 . . .	25	3,13,131	5,03,473	8,16,604
1936 . . .	30	6,43,580	8,04,408	14,47,988

A list of aircraft added to the Indian Register of Aircraft in 1936 is given in Section IV, Administration (Page 60).

7. Future development.

It is now possible to give more definite information with regard to the plans for the future in their effect on Indian air transport. The Government of India, in common with the Governments of other Empire territories, have decided to participate in the Empire Air Mail Scheme, which so far as India is concerned will commence operation at the end of 1937. This will have a far reaching effect on the Indian companies—Indian Trans-Continental Airways, Ltd., Tata Sons Ltd., and Indian National Airways Ltd. In fact much of the difficulty in the negotiations, which have continued over a long period, was to arrange adequate participation and development of the Indian services.

The essence of the scheme, which covers all British territories except those on the American Continent, is to transfer all inter-Empire first class mail to the air without appreciable increase of postage. To do this the number of services will be increased, and at the same time a new fleet of larger and faster landplanes and seaplanes will be put on the service, which will thereby be speeded up.

There will be five services to India, two of which will be land-plane services following the normal route and terminating at Calcutta. Three services will be operated by flying boats, which will follow much the same route across northern India, except for a landing at Delhi and will continue the service to Singapore, two going on to Australia. The scheduled time from England to Karachi will ultimately be reduced to 2½ days, and 3½ days to Calcutta.

The new service will not come into operation all at once. The South African service for example was started in June, 1937. The first stage on the India-Australia route will extend the "all up" mail scheme as far as Singapore at the end of 1937. This will involve four services to India, two seaplane services continuing to Singapore. At this stage the time table will provide a four-day journey between England and Karachi. Early in 1938, two flying boat services will be extended to Australia, and a fifth service will be added. As experience is gained the schedule will be speeded up. The new machines will be introduced on the services gradually, in advance of the above programme, at first in trial flights and later in substitution for existing machines.

The flying boats, of which a fleet of 28 has been ordered and which are already in operation on the African and Mediterranean routes, are the Short Canopus class, a four-engined boat carrying a total pay load of $3\frac{1}{2}$ tons at a cruising speed of 165 miles an hour. Each is fitted with four Bristol Pegasus engines, giving a total horsepower of 3,180, and has an all up weight of approximately 19 tons. Three passenger cabins provide accommodation for 24 seated passengers with convertible sleeping accommodation for 16.

The landplanes, of which 12 have been ordered, are Armstrong Whitworth Ensigns. Eight of these will be used on the Indian route. These machines are powered with four Armstrong Siddeley Tiger engines giving a total horsepower of 3,520. The total loaded weight of these machines will be approximately 20 tons, of which $3\frac{1}{2}$ tons will be pay load. They provide accommodation for 27 passengers by day, with sleeping accommodation for 20. They are expected to have a top speed of 200 miles per hour and to cruise at 160 miles per hour.

The annual load of mails to be transported from India is estimated at 211 tons, which represents approximately .81 tons on each service, and the contribution of India and Burma to the scheme has been fixed at an average of Rs. 13.7 lakhs a year, of which Burma will pay Rs. 1.14 lakhs. This payment, which is equal to Re. 1 as. 3 per ton-mile, represents a great reduction in the cost of air carriage of India's mails and compares more than favourably with prevailing rates elsewhere.

Since all first class mails to Empire countries will be sent by air, the air surcharge on such mails will disappear. The postage rate will be uniform at $2\frac{1}{2}$ annas for $\frac{1}{2}$ oz. For the users of the air mail there will be a great economy.—the existing rate being $7\frac{1}{2}$ as. for the first $\frac{1}{2}$ oz. Since about 20% of the first class mail now goes by air this economy will be considerable. Another large body of private correspondents will experience no change in cost,

since the bulk of private letters fall within the first $\frac{1}{2}$ oz. Bulky commercial papers, if sent as letter mail, will involve increased expenditure, but much of this class of document can, by conforming with the Postal Regulations, be sent as parcel or packet mail, and no doubt a considerable volume will cease to be sent as first class mail. Air mail to non-Empire countries and internal air mail will continue to be accepted on payment of the appropriate surcharge, which will remain unchanged. The increased frequency of the air services will improve their utility for internal mail which is expected to increase in volume.

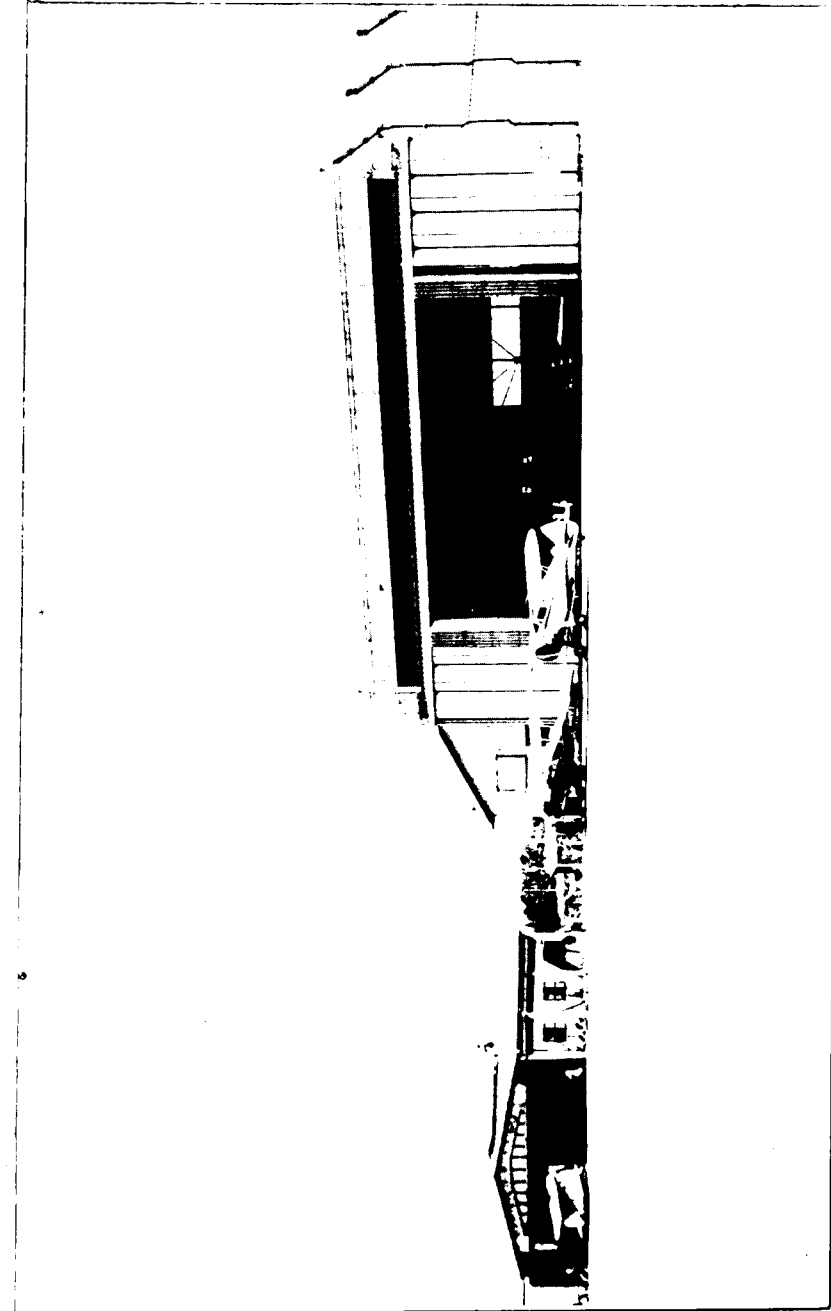
Indian Trans-Continental Airways will cease to operate between Karachi and Singapore and their operations will be transferred to the England-Calcutta services, of which they will operate half in conjunction with Imperial Airways. For this purpose they will purchase half the fleet of Armstrong Whitworth Ensigns—that is four of these machines. The capital of the company will be increased from Rs. 10 lakhs to Rs. 32 lakhs. The best measure of the enlarged scale of operations of the company is the increase in the capacity ton-miles to be operated from 750,000 ton-miles to 3,000,000 ton-miles a year. The agreement provides for the employment of Indian personnel to the extent that qualified and experienced men are available. In view of her special participation in the landplane services, India will take no direct part in the operation of the seaplane services, but the route is being organised by the Government of India on behalf of the British Government. Arrangements have also been made for the training and employment of Indians in the ground services on the seaplane route.

Tata Sons, Ltd. will give effect to a large development in the services to South India, which will be increased to a frequency of five a week. Negotiations with the Government of Ceylon have been concluded and the service will be extended to Colombo with the same frequency from the date of introduction of the scheme. The preparation of the extension of the air route is in progress, including an aerodrome at Trichinopoly, which will be a regular scheduled halt. The equipment of the northern portion of the route with wireless stations and air route and aerodrome lighting is also in hand. New machines will be put on the service, including twin-engined machines fitted with radio on the Karachi-Bombay section. Apart from some increase in cruising speed the new machines will provide passenger accommodation which is severely restricted on the existing service. It is estimated that the annual load of mails to be transported on the Karachi-Colombo route will be 500,000 lbs. and for this service Tata Sons, Ltd., will be paid Rs. 15 lakhs a year, with an additional payment of Re. 1 per lb. for any weight in excess of 500,000 lbs. The Government of Ceylon will contribute

proportionately. The growth in the Tata operations, as measured by the capacity ton-miles operated, will be from 76,500 ton-miles to 306,000 ton-miles—a fourfold increase.

The contract to be allotted to Indian National Airways for the operation of the Karachi-Lahore service will also provide for 5 services a week. The load of mails to be carried is estimated at 150,000 lbs. a year, for which Indian National Airways will be paid Rs. 3.25 lakhs with an additional payment of Re. 1 per lb. for any weight in excess. The mail load and prospective passenger load will be smaller than on the South Indian service and to begin with the service will be operated with single-engined aeroplanes. The Karachi-Jacobabad section of the route is being equipped with aerodrome and route lighting to enable the maximum time-saving advantage to be provided. The scale of Indian National Airways operations will increase from 30,300 capacity ton-miles a year to 94,000 ton-miles.

To face page 22.



BOMBAY.—The new hangar at Juhu Aerodrome, with machines of the Tata air mail service.

SECTION II.

FLYING CLUBS, TRAINING & PRIVATE FLYING.

A.—FLYING CLUBS AND TRAINING INSTITUTIONS.

The flying clubs and training institutions actually in operation during the year were :—

FLYING CLUBS.

British India—

1. Delhi Flying Club, Ltd., Delhi.
2. Karachi Aero Club, Ltd., Karachi.
3. Bombay Flying Club, Ltd., Juhu, Bombay.
4. Madras Flying Club, Ltd., Madras.
5. Bengal Flying Club, Ltd., Dum Dum, Calcutta.
6. United Provinces Flying Club, Ltd., Cawnpore and Lucknow.
7. Northern India Flying Club, Ltd., Lahore.

Indian States—

1. The Jodhpur Flying Club.
2. The Hyderabad State Aero Club.
3. The Jaipur Flying Club.

The Burma Flying Club remained nominally in existence, but flying was restricted to the members of the Rangoon Flying Syndicate which is dealt with under Private Flying. The Rajpipla Flying Club was formed in Rajpipla State but there was no active flying.

The Hyderabad State Aero Club was formed in February, 1936, with a capital grant from the State for the purchase of aircraft and an annual grant of financial assistance. A European pilot-instructor and ground engineer were appointed and flying instruction was actively carried on during the year. The plans of the Club, in conjunction with the State, include advanced flying training and the training of personnel in aeronautics and engineering in co-operation with the Osmania Central Technical Institute, Hyderabad.

The Jaipur Flying Club was started in March, 1937, with the full aid of the State. The European instructor is His Highness's personal pilot, and a European ground engineer is employed.

A Summary of the work of flying clubs and training institutions is given in Appendix 13 (page 88).

Aeronautical Training Centre of India.—The Training Centre completed its first full year of work and during the year considerably improved its equipment and organisation. The instructional staff at the end of the year consisted of :—

- (i) The Principal.
- (ii) Chief Ground Engineer Instructor, and Engineer Instructors.
- (iii) Engineer Instructor—Woodwork.
- (iv) Instructor—Mechanical Drawing.
- (v) Instructors—Wireless Telegraphy and Electricity.
- (vi) Pilot Instructor—Flying, Air Navigation and Meteorology

The technical equipment available includes :—

Aircraft.

Gipsy Moth, Mk. I.
Comper Swift.
Miles Hawk.

Machinery.

1. *Engineering Plant*—

2 lathes, 2 vertical drills, 2 shaping machines, 1 grinder
1 power saw, 1 nibbler and 1 milling machine.

2. *Woodworking Plant*—

1 spindle moulder, 1 planer, 1 saw bench and 1 fret saw.

3. *Testing Plant*—

1 Izod impact machine and 1 Brinnel hardness tester.

4. *Wireless Plant*—

1 Aircraft direction-finding installation. 1 Aircraft long and short wave wireless set. Keys, buzzers and lights are provided for signalling instruction. A certain amount of semaphore signalling is given with flags.

5. *Demonstration equipment*—

1 Bristol Jupiter, 1 Armstrong Jaguar, 1 Rolls Royce Eagle,
1 Wolseley and 1 Beardmore aero engines.

The students are enrolled for varying periods up to three or four years. The maximum number of students enrolled at any one time was 80, which represents the capacity of the institute.

The Government of India granted four scholarships for training as wireless operators. The scholars completed a six months' course at the Training Centre in March, 1937, and were transferred to Government wireless stations for further practical training preparatory to taking their aircraft wireless operator's certificates. The Aeronautical Training Centre is not subsidised by Government.

Ab initio flying training was carried out by the Delhi Flying Club under an agreement whereby the Training Centre maintained the aeroplanes of the Club, who employed no engineering personnel. Advanced flying training was given on the Training Centre's own machines by their own instructor; 310 hours of such flying was done.

As a means of instruction to the students in aircraft construction, arrangements were made with Messrs. Phillips and Powis for the construction of the Miles Trainer in the Training Centre. Servicing was undertaken for private owners and flying clubs and consulting work for aerodrome projects and aviation insurance companies. Arrangements were also made for the conduct in India of the examinations of the Royal Aeronautical Society and two cadets passed the Associate Membership examination in May, 1937.

Subsidy.—The seven clubs in British India remain the only recipients of Government subsidy for aviation training. The system of subsidy which was described in last year's report holds good for three years of which the year 1936-37 was the first. The revised system made the earnings more dependent on the *ab initio* training accomplished, by reducing the fixed part of the subsidy and increasing the proportion to be earned in bonuses for "A" licences issued and renewed.

In the result of the first year's working there was very little change in the training and renewal of licences of "A" licence pilots and the financial earnings of the clubs, in consequence, suffered a reduction. The Government of India, therefore, agreed at the end of the financial year to make additional special grants for the year up to the maximum amount earnable. The condition of the special grant was that it should be placed to the credit of reserve funds for depreciation and accidents, which may only be used with the consent of the Director of Civil Aviation. The final effect of the subsidy for 1936-37, therefore, was that each of the seven clubs was granted the maximum payable, *viz.*, Rs. 20,000 irrespective of the actual results. In addition the sum of Rs. 2,000 was earned by the Jodhpur Flying Club in the form of bonuses for "A" licence pilots. The total subsidy payments during the year amounted to Rs. 1,45,128 out of the Budget grant of Rs. 1,50,000. Of this sum Rs. 23,000 was debited against the Petrol Tax Fund.

The bonus system in the subsidy agreements is subject to modification year by year. The bonus for "A" licences issued and renewed remains the same for 1937-38 as for last year, *viz.*, Rs. 300 and Rs. 100 respectively, but the question of an additional bonus has not been finally settled.

B.—TRAINING RESULTS.

In Appendix 13 will be found a summary of the work of the flying clubs and training institutions for the year 1936. The following table gives more detailed results of the flying training compared with 1935 results.

Club or Institution.	Pilots trained.						A licences renewed.		Ground Engineers trained.	
	A.		A-1.		B.		1935.	1936.	1935.	1936.
	1935.	1936.	1935.	1936.	1935.	1936.				
Bengal.	11	8	...	...	...	...	16	26	...	1
Bombay	17	9	...	2	...	5	12	23	2	2
Delhi	8	16	...	...	...	2	12	18	3	...
Karachi	16	11	...	...	3	3	20	22	2	...
Madras	5	13	1	3	...	...	17	17	3	...
Northern India	6	13	1	...	...	...	4	8	...	1
United Provinces	8	3	3	1	1	2	9	8	...	2
Jodhpur	...	4	...	...	...	...	...	6	...	...
Hyderabad	...	6	...	...	...	...	...	...	...	...
Rangoon Flying School	6	...	1	...	...	...	...	...	1	...
Aeronautical Training Centre of India.	...	...	...	...	...	...	...	1	...	...
Totals	77	83	6	6	4	12	90	129	11	6

NOTE.—During 1936 the Aeronautical Training Centre worked in conjunction with the Delhi Flying Club on a system whereby the latter carried out all *ab initio* flying training. The training of "A" licence pilots by the Delhi Flying Club, therefore, includes the former's pupils.

The membership of flying clubs remains stable round about 1,600 or 1,700, of whom two-thirds are Indians. The aircraft employed in clubs and training centres shews a slight increase at 36. The fall in the number of hours flown from 10,860 in 1935 to 9,990 in 1936 is attributable to the closing down of the Rangoon Flying School early in 1936 and may also be in part due to the dearth of pilot instructors, which was mentioned in last year's report and caused a break in the operations of one or two of the flying clubs during 1936. Two Indian instructors were specially trained to repair the situation and both are now in charge at clubs as flying instructors.

Although instructional flying time fell from 3,171 to 2,877 hours there was an appreciable increase in the total number of pilots trained, wholly due to the increased number of "B" licences issued. Training for the "B" licence requires 200 hours' experience and it is therefore probable that a great deal of this training was actually started in 1935 while the results of completion are reflected in 1936. It is notable that the flying clubs trained 12 "B" licence pilots as compared with four in 1935. This result reflects creditably on the standard of instruction given by the flying clubs in India. 50 per cent. of the "B" pilots licensed in 1936 were wholly trained in India as against 25 per cent. in 1935.

The "A-1" licence is, in its old form, mainly a stepping stone to the "B" licence, and the training results call for no particular comment. The increase in scope of the licence provided in the new Indian Aircraft Rules, referred to elsewhere, may bring about an increase in the issue of this type of licence.

Pilots trained for the "A" licence amounted to 83 compared with 77 in 1935. At the same time 129 licences were renewed in 1936 compared with 90 in 1935. In spite of this, as will be seen from the licensing figures given elsewhere, there was a small drop from 234 to 227 in the number of "A" licences current at the end of the year—a figure which has remained about 230 for the last three years. The wastage more or less balances the new entrants. This is not a figure which depends wholly on the flying clubs. Some part of the wastage consists of pilots who obtain higher qualifications and therefore represent a gain and not a loss, some of pilots who leave the country or the vicinity of a flying club, but it is undoubtedly true that the majority consists of pilots who after obtaining their qualification give up flying for reasons of finance or inertia. It was hoped that the increased bonus for renewal of "A" licences would check this tendency.

There was a drop in the number of current pilot-instructor's licences at the end of the year from 13 to 11. With a grant of financial assistance from Government two Indian pilot-instructors were trained but did not obtain their licences until early in 1937.

Of the Wireless Operator trainees referred to in last year's report as receiving Government assistance, two completed their training and obtained licences. These have obtained employment. Four others were placed under training with the Aeronautical Training Centre, and should complete their training in 1937. A total of four wireless operators were trained and qualified during the year.

One Indian pilot trained by the Karachi Aero Club and employed on their instructional staff qualified in the Air Ministry 2nd Class Navigator's examination.

Standard of Training.—With the exception of the Delhi Flying Club, all flying clubs are able to give training for the Ground Engineer's licence in categories "A" and "C". The Delhi Flying Club employed no ground engineer staff during 1936, since they worked in collaboration with the Aeronautical Training Centre who could give full ground engineering instruction. This arrangement has since been modified so that the Delhi Flying Club employ their own engineering staff. A club which is able to train for "A" pilots and Ground Engineer's licences in "A" and "C" category should have no difficulty in training pilots for the "A-1" licence under the Indian Aircraft Rules, 1937.

The Indian Aircraft Rules, 1937, introduce a new requirement in respect of instrument flying and more stringent requirements in respect of night flying qualifications for the pilot's "B" licence. During 1936, the Bombay, Karachi, Jodhpur, and Hyderabad Clubs and the Aeronautical Training Centre were approved to give training in instrument flying training, and since then approval has been given to the other subsidised flying clubs to carry out this training. With the provision of route lighting on the trans-India route the flying clubs at Karachi, Delhi and Cawnpore (U. P.) are in a particularly favourable position for night flying training.

The Karachi Club is the only club having a qualified 2nd class navigator on the instructional staff; the chief instructor of the Aeronautical Training Centre was a qualified navigator. The United Provinces Club employed an ex-Dufferin cadet as a navigation instructor, who is in the course of obtaining the air qualifications. The Aeronautical Training Centre is the only institution apart from the Government Posts and Telegraphs School which is able to train for the aeronautical wireless operator's licence and for the higher categories of Ground Engineer's licences.

There is a wide gap between the standard of training required for the pilot competent to handle the small charter aeroplane and the pilot competent to take command of the commercial aeroplane of modern type. It is a gap which India has not yet been able to bridge and is unlikely to be able to do so without substantial financial assistance to the trainees.

Civil Aviation Scholarships.—Apart from the special training of staff for the Civil Aviation Department mentioned in Section IV, the following assistance was given by Government for the training of Indians :—

Wireless Operators.—Of the three persons who started their training in 1935, two completed their training in 1936, qualified, and have obtained appointments with Tata Sons, Ltd. Four students were placed under training with the Aeronautical Training Centre in 1936 and will complete their training in 1937.

Pilot Instructors.—Two Indian pilots who had been employed as Assistant Instructors with flying clubs while holding "B" licences were given special courses of instruction at the Karachi and Bombay Flying Clubs and obtained Pilot Instructor's licences. One is now employed as Pilot Instructor at the Bengal Flying Club and the other at the U. P. Flying Club.

Transport Pilots.—A grant was made to a "B" licence pilot selected for training as a First Officer in Indian Trans-Continental Airways. He was sent to Air Service Training, Ltd., at Hamble for courses in air navigation, wireless telegraphy and ground engineering in "A" and "C" categories.

Research Student.—Assistance to Mr. P. P. Nazir for his research work at the East London College was continued throughout the year. The work of Mr. Nazir on an improved method of lateral control of aeroplanes has attracted considerable attention, and the possibility of the evolution of a practical device appears sufficiently promising for the continuance of financial assistance to carry the experimental work to a more advanced stage.

Scholarships granted by local Governments, Indian States and private bodies.—The Madras Government granted a scholarship to Mr. C. G. Arya of the Madras Flying Club for a course of 15 months at Air Service Training, Ltd., Hamble. The course will consist of training for the pilot's "B" licence, 2nd class Air Navigator's licence and W/T Air Operator's licence. The scholarship commenced in February, 1937.

The Wankaner State has given a scholarship of Rs. 8,000 to Mr. Premchand S. Sanghvi, a native of Wankaner, for a course of instruction in flying for the purpose of obtaining the pilot's "B" licence.

The Indore State has given scholarships to two persons undergoing training in aviation—one at Karachi as pilot and ground engineer and the other at Delhi as pilot.

The Sir Ratan Tata Trust and Sir Dorabji Tata Trust have between them helped a certain number of people to make careers in aviation. The latter continued its assistance and granted the following scholarships during the year 1936 :—

		Rs.
1. Mr. Adi Murzban Irani.	Karachi Aero Club, Ltd.	1,000
2. Mr. P. J. Nariman	U. P. Flying Club, Ltd.	1,000
3. Mr. J. M. Engineer	Aeronautical Training Centre of India, Ltd.	3,000*

* For two years 1936 and 1937.

In addition, certain Indian States and private bodies have assisted the cause of civil aviation by the grant of minor scholarships.

C.—PRIVATE FLYING.

Aero Club of India and Burma.—The Aero Club of India and Burma represents the interests of the affiliated clubs. The Delhi, Karachi, U. P., and Madras Flying Clubs are affiliated, with full membership facilities and the right to wear Aero Club of India and Burma colours. It is hoped that the remaining flying clubs will take advantage of the facilities of representation which the Aero Club of India and Burma affords.

The Aero Club of India and Burma continues to serve the private aviator in connection with customs carnets, diplomatic permits, licences for the carriage of arms and cameras and maps for flights abroad. In 1936 the Club acted on nine occasions in obtaining foreign permits. A stock of aviation maps is maintained at Karachi, Delhi, and Calcutta for hire to aviators either visiting India or going abroad. The Aero Club is also the body responsible for the organisation of the following awards :—

The Viceroy's Trophy.—His Excellency the Marquess of Linlithgow has graciously offered a Trophy to be held by the winner of the Viceroy's Trophy Air Race. The date of the next race has not yet been decided.

The Marquess of Willingdon Challenge Trophy.—This trophy, presented by the Marquess of Willingdon, will be awarded for the most meritorious flying performance each year by an Indian national, or the holder of a current Indian pilot's licence gained in India, provided that he or she has been resident in India for at least six months of the year.

A unanimous decision of the Committee awarded the trophy in its first year to Mr. P. D. Sharma, a pilot employed on Indian National Airways' Karachi-Lahore service. This pilot had flown over 750 hours, of which 80 hours was night flying, in all weathers, with 100 per cent. regularity in spite of the fact that the route is not fully organised for night flying.

The Sassoon Trophy.—Sir Victor Sassoon, the founder of the Aero Club of India and Burma, has offered a trophy and an annual grant of Rs. 3,000 to the flying club which has best contributed to the progress of civil aviation through the flying club movement in India. The rules are not yet framed but the competition will be open to clubs affiliated to the Aero Club of India and Burma only.

Flying by Private Owners.—Until such time as the aircraft manufacturer makes more ambitious attempts to place his aviation

wares in the Indian market the private ownership of aircraft will not receive the attention and support that it deserves. Intelligently used the private aeroplane, especially if its owner be the pilot, can prove itself of real utility.

One such owner in North Bihar, where road and rail communications are at a premium, uses his aeroplane to conduct all his business tours. By this means he visits his clients and arrives back at his headquarters, his business completed, before his business rivals have even reached the same clients by the use of surface transport. What normally entails a 24-hours' tour is done by air between breakfast and tiffin. On one of these tours this owner not only secured an order on his own behalf but sold a three-seater cabin aeroplane to the same purchaser who was so intrigued and impressed at the salesman's mode of travel.

Furthermore, the expenses in the operation of this aeroplane including fuel, repairs and overhauls, spare parts, landing fees and police guards are said to be only 1½ annas a mile for a total mileage neighbouring 14,000 during the year.

Another private owner, an Army Officer, used his light aeroplane to fly to England for his home leave. Being in no great hurry he took 27 days to fly from Calcutta to London, but included in this period were 10 days spent in Karachi and time for sight seeing in various places of interest in Asia Minor and Europe.

With the closing of the Indian National Airways' School at Rangoon, as stated in last year's report, the Burma Flying Club's flying activities came temporarily to an end. A syndicate of members was however formed to take over the school Moths on an instalment purchase system for private use. Known as the Rangoon Flying Syndicate, this organisation has nine members each of whom has an "A" licence. It commenced flying in April, 1936, and flying has been carried on continuously since then, with frequent cross-country flights. The syndicate performed a very useful service by placing a Moth at the disposal of an R. A. F. officer who was thus enabled to make an inspection by air of all R. A. F. grounds in Burma. The Syndicate is affiliated to the Burma Flying Club, which itself has 30 members, and having completed the purchase of one Gipsy Moth has recently taken over a second. The total number of hours of flying done during the calendar year 1936 was 161 and eight "A" licences were renewed.

Many of the Indian Princes have from early days given active support to aviation development and have been in the forefront of private owners of aircraft. A separate section of the report (Section VI) has been opened to record activities in the Indian

States and includes instances of the employment of aircraft for personal as well as State purposes.

One large industrial company, the Tata Iron and Steel Company of Jamshedpur has owned an aeroplane for several years and employs it for tours and special journeys by principals of the company.

Privately owned aircraft.—The number of registered privately owned aircraft on the 31st December, 1936, was 56 as against 43 on the same date in the previous year. The increase of 13 during the year is an indication that this branch of aviation is making steady progress, though not to the extent that might be expected in view of the favourable conditions in this country for aircraft to display their advantages for fast and comfortable transport over long distances. Of the 56 private aircraft, 21 were owned by Ruling Princes and Rajahs and 35 by others. All except five of these aircraft are of British design and manufacture.

Cost of ownership is the deterrent; that the interest exists was shewn by the number of persons who started themselves to build the "Flying Flea" to the general design of Monsieur Mignet. An inherent aerodynamic defect was found to be present, not before there had been a number of fatal accidents from this cause in Europe, and further endeavours in this direction were brought to a close.

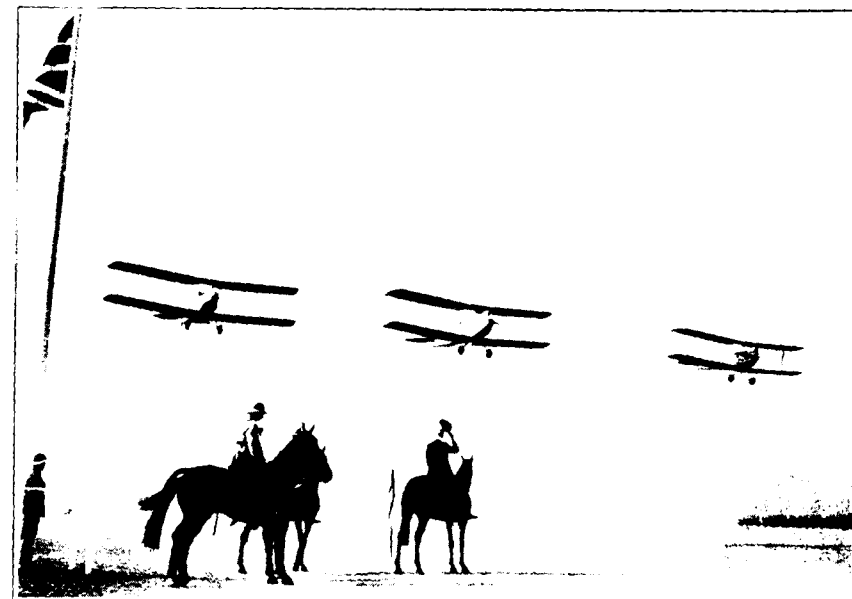
International Flights.—During the year there were a total of 26 international flights to and from India or across India by non-Indian aircraft, and seven international flights to and from India by Indian aircraft. One of the most remarkable and useful of these flights was again the Bombay Flying Club's annual training flight to England and back, which this year was accomplished by three machines and for the fourth time was completed without mishap and almost without incident.

Messrs. Melrose and Chichester, Miss Jean Batten and Miss Bessie Owens flew over the trans-India route in the course of their long-distance attempts during the year. Miss Batten established a new solo flight record from England to Australia in 5 days, 21 hours, 2 minutes, and from England to New Zealand in 11 days, 1 hour and 25 minutes.

Among other visitors to India by air were a French military aircraft conveying General Denain, Inspector General of the French Overseas Military Air Service, and visitors from America, the Phillipines, Latvia, and other distant countries.

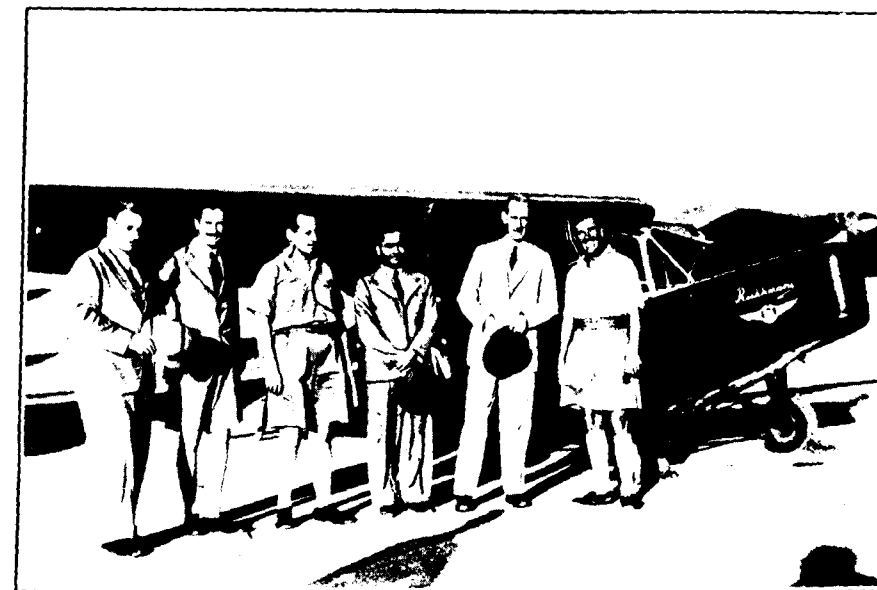
Arrangements were made along the trans-India route for the Paris-Saigon-Paris Air Race, which however apparently failed to raise a great deal of international interest.

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BENGAL.—Fly past of the Bengal Flying Club before H. E. the Governor of Bengal at the Proclamation Parade, December, 1936.

(By courtesy of "The Statesman")



KARACHI.—H. E. the Governor of Sind (2nd from right) with members of the Karachi Aero Club on the occasion of an inspection of the airport.

SECTION III.

GROUND ORGANIZATION.

A.—REVISED CAPITAL WORKS PROGRAMME.

The Government of India having decided to participate in the Empire Air Mail Scheme, it was necessary at the end of the year to revive the postponed items of the programme amounting to Rs. 18,02,225, referred to in the last report. The opportunity was taken to revise the programme totalling Rs. 1,10,12,625 (£825,950) to take into account actual costs and later estimates, and to substitute new items of work which had proved urgently necessary for others of less urgency.

The expenditure in 1936-37 including expenditure on Wireless works was approximately Rs. 26,33,600, making a total up to date of Rs. 39,56,400 (£296,730), that is about half the approved programme.

Progress in actual expenditure has been slowed up by a variety of causes. A large programme of expenditure, which had to be formulated prior to investigation of the works and aviation problems involved, could not be put in hand at once. Preliminary investigation and preparation of estimates in the ordinary course take a considerable time, and when the solution of the problem reveals itself only after investigation and rejection of successive schemes, and in some cases trial works, it is not possible to put a time limit on the preliminary stage. Some of the causes which have operated to delay expenditure are referred to below.

It was found desirable to get out revised standard scales and types of quarters to obviate anomalies between employees of different services housed on aerodromes, and to provide a more suitable standard of accommodation for the hot weather than was provided by some of the existing plans. Consideration of this question, with its attendant preparation of plans, extraction of quantities and re-estimation necessarily took a considerable time and it is only recently that it has been possible to complete this preliminary work. In some cases, other building work has been deferred, so that all building could be undertaken at the same time.

In some cases, the selection of suitable sites for aerodromes has proved to be extremely difficult. Often, after a site had been

selected, further detailed survey brought to light obstacles which had not previously been apparent: new sites had to be investigated, with attendant delays in resurveying and preparation of estimates. Thus, at Rangoon, the new site at Okkyin proved on survey to have too great a gradient and to be limited in certain other respects. At Rannad, the sites examined and surveyed amounted to a dozen or more before a satisfactory one was found, after more than two years.

A very large portion of the expenditure has been deferred in this way, but the work of the staff has not been lightened, and it is satisfactory to know that the bulk of this preliminary work has now been done.

In last year's report, the works included in the programme are set out. The following notes show the progress that has been made, with notes on the principal work outstanding:

Hangars. Out of the nine new hangars, seven have now been completed and are either occupied or will shortly be taken into occupation. Their location is shown in the last report. The hangars at Madras and Rangoon have not been erected because the aerodromes are not ready. At Madras, negotiations are still proceeding with Defence Department for the development of the existing aerodrome. At Rangoon a suitable aerodrome site has not yet been found.

Lighting. The lighting of the trans-india route and of Bombay aerodrome has been completed. The equipment provided has proved satisfactory. Minor adjustments, particularly in the arrangement of boundary lights and obstruction lights continue to be made. Some of the route beacons are in remote districts and for this reason are automatically controlled, lighting themselves at dusk and extinguishing themselves at break of day, but it has been found desirable in the early stages to keep staff to supervise them. Details of lighting are given in the last report.

Trans-India Route.

Karachi Air Port. Completed: Hangar; extension of aerodrome; approach road and internal roads; storm water drain; fencing; aerodrome lighting. The main administration building, quarantine station and quarters were commenced shortly after the close of the year. The whole year was taken up in the preparation of detailed estimates and plans and calling for tenders prior to sanction. The following works commenced during the year are still in progress: acquisition of land; clearing and levelling for

sanitary airport buildings; construction of additional W.T. quarters. The total estimate for Karachi is Rs. 13,00,000 (round).

Hyderabad (Sind). Completed: Lighting of aerodrome; construction of quarters.

Dhara Nara. Completed: Route beacon.

Uchali. Completed: Lighting of aerodrome; construction of quarters.

Jodhpur. Completed: Construction of Adcock direction-finding W.T. station, which remains to be calibrated.

Merta Road. Completed: Route beacon and power house.

Rasuri. An air route beacon has been constructed and will shortly be erected.

Delhi. Completed: Hangar; administrative building; runways; improvements to drainage. The construction of an Adcock direction-finding W.T. station and additional W.T. quarters is still in progress. Quarters for aerodrome and meteorological staff will shortly be taken in hand.

Etah. Completed: Route beacon and power house.

Cannara. Completed: lighting of aerodrome; acquisition and extension of aerodrome. The following works commenced during the year are still in progress: Buildings; fencing; drains and roads.

Allahabad. Completed: Erection of hangar; lighting of aerodrome. An Adcock direction-finding W.T. station and quarters for aerodrome and meteorological staff will shortly be taken in hand, together with improvements to drainage, internal roads and a runway, and it is hoped that construction will be completed before the end of 1937.

Mughal Sarai. Completed: Route beacon.

Gurga. Completed: Levelling; drainage; fencing; new runway; office; quarters; lighting of aerodrome. An Adcock direction-finding W.T. station will be commenced shortly.

Aurangabad. Completed: Route beacon.

Calcutta (Dum Dum). Completed: Fencing; construction of taxi strip; hangar; lighting of aerodrome. The following works commenced during the year are still in progress: Extension of landing ground; Adcock direction-finding W.T. station; quarters for W.T. staff. Further works: An administration office,

quarters for aerodrome and meteorological staff and a runway will be commenced shortly.

Chittagong.—Completed : Extension, fencing and drainage of aerodrome.

Akyab.—Completed : Improvements to existing runway ; additional runway ; extension of ground ; drainage ; hangar ; lighting of aerodrome. Further works : An administration office and quarters for aerodrome and meteorological staff will be commenced shortly.

Bassein.—Completed : Runways ; extension of aerodrome.

Rangoon.—Completed : Lighting of Mingaladon aerodrome (other work deferred).

Karachi-Lahore Route.

Jacobabad.—Completed : Runway ; office ; hangar ; quarters ; fencing ; improvements to drainage and landing ground. Further works : Quarters for aerodrome staff and further improvements to the drainage of the landing ground are being put in hand.

Multan.—Bad drainage and poor soil make the problem difficult. Preparation of surveys and estimates for sites is still in progress.

Lahore.—Completed : Hangar. The following works commenced during the year are still in progress : Extension of landing ground ; fencing ; drains. Further works : Quarters for aerodrome staff will be commenced shortly.

Karachi-Bombay-Madras Route.

Mughal Bhim.—Completed : New landing ground.

Ahmedabad.—Completed : Construction of W/T. transmitting station and Adcock direction-finding station, but the latter not calibrated. Quarters for W/T. staff under construction. Construction of the new landing ground together with a small hangar and quarters for aerodrome staff will commence as soon as acquisition has been completed.

Surat.—After great difficulty on account of the unstable nature of the soil, a site has been found which it is hoped will prove suitable (in place of Dharampore). Surveys and estimates are being prepared.

Bombay (Juhu).—Completed : Improvements to drainage ; runway ; taxi-strip ; hangar ; lighting of aerodrome. Further works : A small administration office and quarters for aerodrome

staff are still to be erected. Additional W/T. transmitter and Adcock direction-finding station under construction. The expansion of aviation activity at Bombay has recently shewn an additional hangar to be urgently needed.

Hyderabad.—Completed : Construction of W/T. station.

Cuddapah.—Completed : New landing ground.

Donakonda.—Construction of new landing ground in progress.

Trichinopoly.—The aerodrome has been taken over from the Royal Air Force. Extension and improvement of the landing area are in progress. Quarters for aerodrome staff are to be built.

Ramnad.—A site for the landing ground has been selected, estimates are being prepared and it is hoped that work will commence shortly.

B.—TRANS-INDIA SEAPLANE ROUTE ORGANISATION.

After careful investigation of the seaplane route across India and Burma, alighting areas for flying boats have been selected at :—

- Karachi (Keamari West Wharf).
- Udaipur State (Rajsamand Lake).
- Gwalior (Madho Sagar Lake).
- Calcutta (Hoogly River—Akra Reach).
- Akyab (Harbour—Fakir Point).
- Rangoon (River).
- Mergui (Harbour).
- Victoria Point (Harbour).

In addition, emergency refuelling sites have been selected at the following places :—

- Hyderabad (Sind) (Indus River—a few hundred yards below Kotri Railway Bridge).
- Chittagong (Harbour).
- Moulmein (Harbour).

The route from Rangoon has not been finally settled and may be diverted *via* Bangkok.

Full investigations were carried out during the year as to the ground organisation which should be provided at these stations for the efficient operation of the service. This necessitated a great deal of local investigation and consultation with the Air Ministry and Imperial Airways, Ltd., Indian States, local Port and Civil authorities and other Government departments interested in the

details of the scheme. As a result, a complete scheme for the organisation of the route has been drawn up, and detailed plans and estimates for the works to be carried out at each station have been prepared.

The ground organisation proposed for the route includes jetties, slipways, landing stages, offices, workshops, passengers' waiting-rooms, restaurants, wireless stations and meteorological stations in some places and accommodation for Postal, Medical, Customs and Passport Departments. The scheme for the organisation of the route will be financed by the three parties responsible for the operation of the service across India, i.e., the Government of India, the Air Ministry and Imperial Airways, Ltd., but at Udaipur and Gwalior the States are providing certain parts of the organisation. The cost of marine equipment, e.g., control boats, auxiliary launches and mooring equipment, etc., will be provided by Imperial Airways, Ltd., on behalf of the Air Ministry and is not the concern of the Government of India. The works mentioned above have been grouped under three distinct categories, on the basis of the adjustment of expenditure involved as follows :—

(a) *Administrative Organisation.*—This category includes accommodation for the Postal, Medical, Customs and Passport Departments, and the expenditure incurred thereon will be borne by the Government of India. The sum involved is about Rs. 43,000.

(b) *Essential Aids to Navigation.*—This category includes the provision of jetties, slipways, landing stages, wireless and meteorological stations, land acquisition, roads, fencing, drainage, etc., and the cost of these items will in the first instance be met by the Government of India and be repaid later by the Air Ministry. The initial cost involved is roundly Rs. 1,95,000.

(c) *Commercial Organisation.*—This consists of offices, restaurants, waiting-rooms, and quarters for operating personnel and will be provided by Imperial Airways, Ltd., utilising the Central Public Works Department as an agency for the execution of the works.

The construction programme for each station has been framed in relation to the essential requirements of the service and other physical factors at each individual station, and each station will not necessarily be provided with all the items of ground organisation mentioned above.

While it is not expected that any serious difficulties will be encountered in operating from the alighting areas mentioned above it may be found desirable after experience to effect improvements, and initial arrangements at some stations will be made on a provisional basis. At Calcutta, all operational facilities will be located

on a river flat which will be moored in the Hoogly River (Akra Reach). Should it be necessary at a later date to abandon the Akra Reach site, the flat will be towed to a new site. It may later be desirable to move the base from Rajsamand to Sardarsamand in Jodhpur State. It was originally proposed to establish a permanent base at Sardarsamand, but due to a succession of failures of the monsoon in Rajputana, the water level in the Sardarsamand Reservoir has fallen and additional storage works have not yet had their effect, so that it is at present unfit for use as a landing base for flying boats. It will now be necessary to see this reservoir filled and remain at a good level for at least a year or two before it can be considered to be suitable for the purpose. Rajsamand will therefore, be used as an alternative to Sardarsamand, and will continue to be so used until the conditions at the latter reservoir are satisfactory. Operational arrangements at Rajsamand will, therefore, be made on a provisional basis only.

As for the communication organisation for the flying boats operating on the trans-India route the existing wireless and meteorological services will be used where the flying boat route follows the existing landplane route. Direct telephone lines will be provided between the seaplane bases and the local aerodrome control offices for communication of wireless and meteorological messages. At Rajsamand and Gwalior, where the seaplane route deviates from the landplane route, Imperial Airways will provide their own portable wireless sets to establish communication with the flying boat in the air. Similarly, Imperial Airways will provide ground wireless equipment at Mergui, if this route is selected. As regards meteorological facilities, temporary current weather reporting stations will be established at Rajsamand and Gwalior prior to the commencement of the service. It is proposed later to provide permanent wireless and meteorological stations at Gwalior and at Rajsamand if the latter is developed as a permanent base. It is not proposed to provide Government or Port aerodrome staff at the seaplane bases, responsibility for the safety of operations devolving upon Imperial Airways. The water aerodromes on the trans-India route are therefore being licensed for the private use of the company and will not be open to international traffic.

C. GENERAL.

Budget Maintenance, Equipment and Minor Works. The budget estimates for 1936-37 for India and Burma included a provision of Rs. 2,84,100 for works services, consisting of maintenance of aerodromes and landing grounds, purchase of equipment, maintenance and operation of aerodrome equipment and minor works. The

actual expenditure for the year and the budget estimates for 1937-38 for India alone are shown below :—

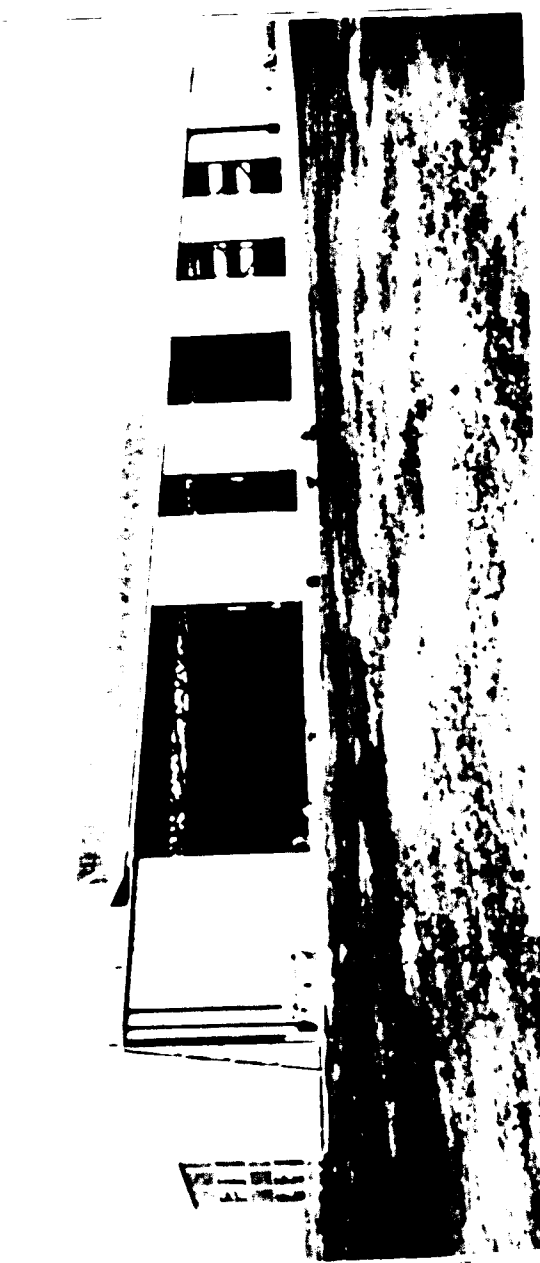
	1936-37 Actual Expenditure.	1937-38 Budget Estimates.
	Rs.	Rs.
Maintenance and repairs of aerodromes and landing grounds	1,20,000	1,56,300
Maintenance and operation of aerodrome maintenance equipment	12,400	18,000
Minor Works	37,600	34,000
Departmental charges	15,000	13,500
Aerodrome operational equipment	20,900	12,000
Maintenance, etc., of aerodrome operational equipment including route lighting	59,200	81,200
	2,65,100	3,15,000

Operational equipment.—The night lighting installations at aerodromes and landing grounds on the trans-India route have been completed and taken into use with a few minor exceptions. They have already proved their efficiency on repeated occasions when delayed services have been enabled to fly on during the night and recover their scheduled timings. The aerodromes at Karachi, Delhi, Cawnpore, Allahabad, Gaya, Calcutta, Akyab and Rangoon, and the landing grounds at Hyderabad and Uterlai are now all available for operation at night on demand. Jodhpur, as is generally known, was equipped with a full night lighting installation in 1935 by the Jodhpur Darbar, and it has been used very frequently for night landings and departures by the trans-India services.

In addition to the lighted aerodromes, a chain of airway beacons from Karachi to Calcutta is also complete and will be in operation during 1937. In tests several of these beacons have been observed at distances ranging from 50 to 75 miles, and pilots have remarked on the confidence they give when operating on a dark night.

Considerable progress has also been made with the supply to aerodromes of a standard complement of operational equipment. Each main aerodrome is now equipped with an ambulance, a mobile fire trailer (which is towed by the ambulance), complete crash and first-aid equipments, ground panel and flag signals for use by day, lamp and pyrotechnic signals for use by night, a signal mast and a variety of minor items, including a hand-cart for laying out flares, canvas strips for marking bad ground, aerodrome bells, Klaxon hooters, binoculars, etc.

Arrangements for the supply and distribution of operational equipment and stores are made by the Chief Aerodrome Officer,



KARACHI AIRPORT The completed 380 feet span which forms one flank in the layout of new airport buildings

Karachi. During the year, a reorganisation has been completed of the stores system, the stores procedure has been made uniform at all aerodromes and other stations, and the accommodation at the Chief Aerodrome Officers' store at Karachi has been enlarged in view of the greater range and quantity of articles now required.

Aerodrome maintenance equipment has also been supplied at the principal aerodromes, and comprises such heavy plant as tractors, rollers, graders, bullock carts, etc.

The need was felt for expert supervision of the operation and maintenance of electrical and mechanical equipment now held on charge, and a proposal subsequently approved was made for the appointment of an Electrical and Mechanical Superintendent to be attached to the office of the Chief Aerodrome Officer. It will be the duty of this new officer to exercise technical supervision over the entire aerodrome and airway lighting installations and all motor vehicles and other mechanical and electrical plant under the Civil Aviation Directorate.

Aerodrome Control. Aerodromes having a ground control, that is to say an officer in charge who is responsible for the safety of flying operations and the regulation of local traffic, have been established at Karachi, Jodhpur, Delhi, Cawnpore, Allahabad, Dum Dum, Akyab, Rangoon, Jacobabad, Lahore, Ahmedabad, Bombay and Hyderabad (Deccan), the five last named being so established in 1936. The aerodromes at Jodhpur and Hyderabad (Deccan) are controlled by personnel employed by the State, to whom facilities for training at Government civil aerodromes were extended in order to ensure a uniform standard.

A further development on the trans-India route which the growing intensity of the traffic demands is the establishment of a system to check the movements of aircraft between the main aerodromes so that by suitable advice they may be warned of the proximity of other aircraft or of any special circumstances which may be vital to their safe navigation. This demands a close co-ordination between the aerodrome control officer, the wireless office and the meteorological office and their accommodation in the same building with easy intercommunication.

Approval of Aerodromes and Landing Grounds. The year was the last in which privately operated aerodromes and landing grounds in British India remained subject only to administrative "approval" before being open to public use. In future they must be licensed under the Indian Aircraft Rules, 1937, and specific responsibilities will be placed on the licencees in the interests of safety and uniformity of operational practice.

Special conditions will be attached to each licence, as the circumstances may require, according to the physical limitations

of the aerodrome and the use proposed to be made of it. Aircraft performance varies considerably in the length of take-off run and initial climb and also in gliding angle and landing run. Therefore, in licensing an aerodrome, not only must the dimensions of the actual landing area be considered, but also the location and height of all surrounding obstructions, the gradient and surface conditions of the ground, its altitude above mean sea level which seriously affects aircraft performance, the prevalence of adverse weather conditions, and the characteristics of the aircraft proposed to be operated on the aerodrome.

The objects of the licensing system are to produce a higher standard of public safety and to guide aerodrome development along sound lines in the interests of both the aircraft operator and the aerodrome owner. Further to assist these objects and to stimulate interest in and knowledge of aerodrome development a publication was issued in November, 1936, entitled * "Notes on the Preparation, Licensing and Operation of Aerodromes and Landing Grounds". This book gives comprehensive information on all aspects of the selection, construction and equipment of aerodromes and describes the procedure to be followed and conditions to be fulfilled in connection with an application for a licence.

The table on the next page shows the increase that is taking place in the number of aerodromes and landing grounds available for civil use. There are now 170 places in India and Burma where a landing ground has been laid out for the reception of aircraft. A great deal of liveliness is apparent in the Indian States and this is dealt with in greater detail in Section VI of the Report where State activities are recorded.

It may be mentioned here that the number of recognised aerodromes and landing grounds in the States has now reached 54. The States of Athgarh, Baroda, Kashmir, Rajpipla, and Sirohi have established new landing grounds, while H. E. H. the Nizam's Government have provided a first-class aerodrome at Hyderabad which will shortly be equipped with night lighting facilities as a part of the plans for a system of air communications to serve the State.

Provincial Government Landing Grounds.—The Bengal Government have finished the construction of Mymensingh landing ground which was mentioned in the list of grounds maintained by the Bengal Government in last year's report, but was then stated to be under construction. This brings the number of grounds maintained by the Bengal Government to six. The Government of Bihar owns and maintains two landing grounds—Muzaffarpur and Patna.

* Out of print. A revised edition is in preparation.

Classification of all aerodromes and landing grounds open to civil aircraft in British India, Indian States and Burma.

Year.	Grounds normally maintained in serviceable condition.							Not normally maintained.		Maintenance not recorded.	Total.
	Open to public use.			Restricted use. Special permission necessary for scheduled air services, joy riding, etc.				Restricted use. Permission necessary.		Restricted use. Permission necessary.	
	Government Civil.	Private.	Indian States.	Local Government.	Private.	R. A. F. and on R. A. F. charge.	Indian States.	Army.			
									Indian States.		
1935	22	4	23	1	3	34	7	22	5	10	159
1936	24	3	27	1	2	34	11	19	8	9	170

British Air Ministry grounds. Available for emergency only.

NOTE.—All these grounds are on the Calcutta-Victoria Point Air Route.

Landing Grounds acquired from the Royal Air Force.—Trichinopoly was transferred by the Royal Air Force for development as a civil aerodrome. At a future date, it is proposed that Jhansi, Montgomery, Hyderabad (Sind), Pad Idan and Poona should be transferred and become civil landing grounds.

Wireless Services.—The number of wireless stations in operation in 1936 remained at thirteen. Further stations will be opened in 1937 as the new works under construction are completed. In addition to the normal airline traffic, the wireless personnel had to handle the movements of a considerable number of Royal Air Force aircraft, including a series of flights between Egypt, Iraq and Singapore. As in previous years, special arrangements had to be made to handle this extra traffic. Excluding broadcast messages, over 20,000 wireless messages were handled between aircraft and ground stations during the year 1936. Messages between ground stations, including broadcast messages, totalled 170,000. This figure represents the number of telegraph operations effected, that is to say, a message transmitted from one ground station and received at another is counted twice. In addition to the main construction programme, a number of minor works were carried out; in particular aviation obstruction lights were fitted on the wireless masts at Calcutta and Lahore.

The training of new operators to meet the expansion of the aeronautical W/T. service, to which a reference was made in the last report, has been proceeding throughout the year and 21 men who were recruited in 1935-36 completed their training. A further 45 men were recruited and are expected to qualify in October, 1937, in readiness for the inception of the Empire Air Mail Scheme at the end of the year and the 24-hours' schedule of watches that will then be required.

Further improvements remain to be effected, however, notably the elimination of the telephone as a link between the aerodrome control officer and the wireless station. This it is hoped to effect by bringing the wireless operator into the control building on the aerodrome, thus avoiding a source of ambiguity and delay in inter-communication which may prove dangerous. With the large increase in traffic now anticipated a further improvement is being made by the provision of short-wave apparatus at each of the stations on the trans-India route so as to provide an alternative channel of communication, and it may also be necessary for the direction-finding stations to work on a different wave length from that used for communication purposes, as has been the practice in Europe for some years past. Further staff will be needed to meet this requirement.

Meteorological Services.—Owing to the increasing amount of night flying, experimental work had to be undertaken on the standardisation of equipment for observing meteorological balloon ascents and the measuring of visibility and cloud height at night. As a result of these experiments and the sanction by Government of extra staff considerable improvement was effected in the routine meteorological services on the Karachi-Calcutta section of the trans-India route. On this section the number of current weather observations was increased from two to three a day, one of these observations being taken and distributed by wireless before dawn for the benefit of early morning departures. This service was supplemented by upper-wind observations made at 3-30 A.M. These observations are distributed by wireless simultaneously with the current weather observations. These nightly balloon ascents are made from most aerodromes along the route from Sharjah to Calcutta.

Auxiliary meteorological stations were opened at Delhi and Bombay (Juhu) and a new pilot balloon station was opened at Trichinopoly. With the co-operation of Imperial Airways it was possible to establish a restricted scheme of current weather reports on the section Bahrein-Gwadar-Sharjah. East of Calcutta special reports on flying days of Imperial Airways were supplied from Akyab and Chittagong.

Special Current Weather Reports. Warnings of adverse weather and improvement thereof.

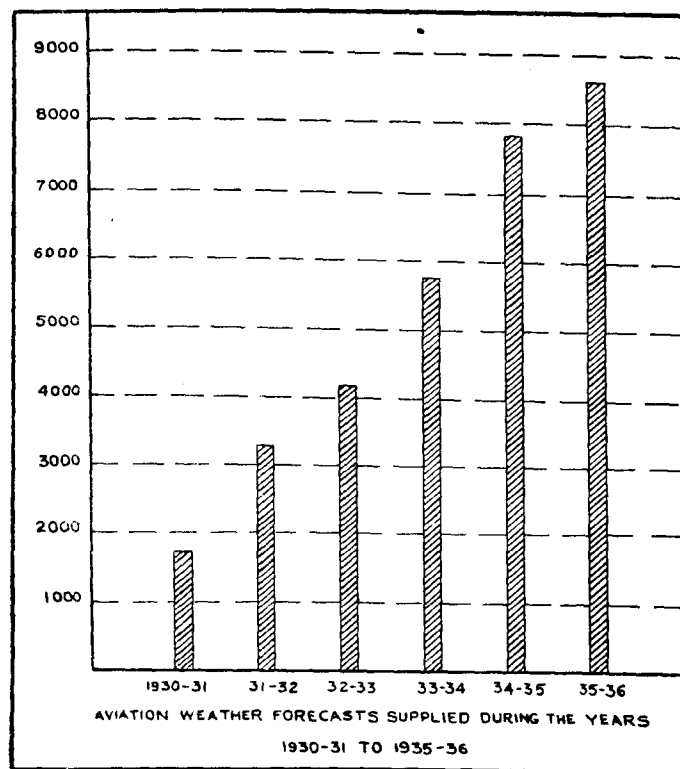
Station.	No. of SPEMET Reports supplied.		No. of DANMET and IMPMET Reports supplied.	
	1935.	1936.	1935.	1936.
Bahrein	<i>Nil</i>	365	<i>Nil</i>	11
Sharjah	<i>Nil</i>	158	<i>Nil</i>	82
Gwadar	<i>Nil</i>	15	<i>Nil</i>	76
Karachi	399	685	74	106
Jodhpur	318	411	26	37
Delhi	145	143	20	48
Allahabad	267	368	29	22
Calcutta	269	492	92	102
Chittagong	346	378	16	48
Akyab	459	534	70	94
Sandoway	439	379	26	42
Bassein	649	413	7	16
Rangoon	682	753	14	45
Victoria Point	296	250	14	2
Tavoy	<i>Nil</i>	108	<i>Nil</i>	6
	4,269	5,425	388	737

Conferences during the year have resulted in the preparation of plans for the dissemination of weather information for the new seaplane service on its introduction and for additional meteorological facilities both for civil and military aircraft.

As has been the custom in previous years, candidates for pilots' "B" licences continued to receive instruction and to be examined in elementary meteorology.

Instrumental observations of atmospheric transparency were commenced at Agra and Poona, with the object of determining the conditions affecting the range of airway beacons. These observations will continue over a long period to embrace varying weather conditions. They will be correlated with non-instrumental observations and pilots' reports. Towards the end of the year, regular observations of the intensity of atmospheric turbulence were started on the Tata air mail service with a recording accelerometer provided to them for the purpose.

A chart showing aviation weather forecasts supplied during the year 1930-31 to 1935-36 will be found in Graph VII below.



Graph VII.

SECTION IV. ADMINISTRATION.

A.—CIVIL AVIATION BUDGET.

The following table shows the actual expenditure of the Civil Aviation Department (excluding expenditure of a capital nature, against Grant No. 63-B. Capital) for 1935-36, the budget estimates and the final appropriation for 1936-37 and the budget estimates for 1937-38.

	Actuals 1935-36.	Budget 1936-37.	Final appropriation 1936-37.	Budget 1937-38.
1	2	3	4	5
1. Direction	4,83,613	7,50,900	6,81,500	7,74,300
2. Works	1,84,805	2,84,100	2,65,100	3,15,000
3. Wireless Services	5,48,669	6,50,000	6,50,000	5,92,000
4. Grants to Flying Clubs	1,34,700	1,50,000	1,50,000	1,40,000
5. Other grants for aviation purposes	2,72,681	4,18,000	3,70,300	6,80,700
6. Expenditure in England on overseas pay, leave salary, scholarships, etc.	86,056	1,27,000	1,16,600	1,02,000
7. Deduct—Probable savings	..	..	..	—1,00,000
Total	17,10,524	23,80,000	22,33,500	25,04,000

The figures in columns 2, 3 and 4 relate to India and Burma. The budget 1937-38 excludes Burma.

Direction provides for the pay of all staff, including Headquarters, Aerodrome and Aircraft Inspection staff, but it includes also certain other expenditure of a miscellaneous nature. The increase is largely due to the expansion of Aerodrome and Inspection staff referred to below.

Works provides for the maintenance of aerodromes and the maintenance and operation of lighting and other equipment. It reflects the increased expenditure consequent on the completion of new works under the Capital Expenditure Programme, and the partial completion and operation of aerodrome and air route lighting.

Wireless Services reflects the increased payments to the Posts and Telegraphs Department for the operation of new stations completed under the Capital Expenditure Programme and the more

extensive operation of existing stations consequent on increased density of traffic.

Grants to Flying Clubs (Sub-head 4) includes Rs. 23,000 of expenditure from the Petrol Tax Fund.

Other Grants (Sub-head 5).—The final appropriation (Rs. 3,70,300) includes expenditure of Rs. 38,700 from the Petrol Tax Fund as shown in the following paragraph. The grants-in-aid to operating companies consist of (a) remission of excise and customs duty on petrol and oil and aircraft spares and stores for the trans-India service, (b) remission of housing and landing charges on the contract mail services, (c) special assistance to Indian National Airways. These grants (amounting to Rs. 3,31,600) coupled with grants to Flying Clubs (Sub-head 4) may be taken as representing the extent of subsidy assistance granted by the Government of India—approximately Rs. 4½ lakhs.

Petrol Tax Fund.—From the additional tax (2½ annas Road Tax) on petrol consumed for aviation purposes, a sum of Rs. 93,000 was made available for expenditure for specified Civil Aviation purposes in the budget for 1936-37. The actual expenditure (in round figures) incurred against the grant is indicated below :—

	Rs.
(1) Subsidy to Flying Clubs (included in Sub-head 4 of Budget table)	23,000
(2) Special grant to United Provinces Flying Club (included in Sub-head 5 of Budget table)	10,000
(3) General expenditure (included in Sub-head 5 of Budget table)	28,700
(4) General expenditure (expenditure in England on items (a) and (b) below)	8,000
Total	69,700

Among the more important items of general expenditure were :—

- (a) Financial assistance to an Indian research student in England to develop a slot and flap device invented by him (Rs. 7,300).
- (b) Financial assistance for the training of an Indian pilot in England as first officer for Indian Trans-Continental Airways (Rs. 700).
- (c) Scholarships to six students for training as wireless operators at the Aeronautical Training Centre of India, Delhi, and by the Posts and Telegraphs Department (Rs. 8,000).
- (d) Provision of portable neon lights for experimental use at Karachi and Delhi (Rs. 2,100).

- (e) Purchase of Holophane lumeters to measure atmospheric transparency in connection with route lighting (Rs. 1,100).
- (f) Installation of a Neon beacon at the Delhi Aerodrome, to test this type of lighting (Rs. 6,100).
- (g) Purchase of a B. A. C. Drone for flying club practice, to ascertain the possibilities of the ultra light aeroplane in India (Rs. 5,900).
- (h) Training of two Indian pilot-instructors (Rs. 2,000).
- (i) Installation of special obstruction light on the top of the Qutb Minar (Rs. 1,200).
- (j) Demonstration of night flying and aerodrome lighting to members of the Central Assembly in connection with the Empire Air Mail Scheme (Rs. 300).
- (k) Experimental operation of wireless telephonic apparatus on the Tata Air Service (Rs. 500).
- (l) Experimental work with a directional radio receiving apparatus by the Aeronautical Training Centre, Delhi (Rs. 500).
- (m) Expenses in connection with the opening of the Willingdon Air Station (Rs. 500).
- (n) Obstruction lights on two masts at the W/T. station, Mingaladon (Rs. 300).

The growth from year to year in the total yield from the additional tax on petrol consumed for aviation purposes and the amounts expended therefrom are exhibited in Graphs IV and V overleaf. An analysis of this expenditure up to the end of 1936-37 will be found in Appendix 14.

B.—ORGANISATION.

The activities of the Civil Aviation Department fall under three main divisions :—

- (1) Headquarters,
- (2) Aerodrome Organisation,
- (3) Aircraft Inspection.

The organisation of each of these divisions is briefly as under.

Headquarters.—Headquarters consist of six main sections or branches dealing with the different activities of the Department.

The gazetted staff comprises—

Director of Civil Aviation.

Deputy Director of Civil Aviation.

Chief Inspector of Aircraft.

Assistant to the Chief Inspector of Aircraft.

2 Engineer Officers.

2 Technical Officers.

Administrative Officer.

The Administrative Officer is an Indian; the rest are Europeans. The appointments of one Engineer Officer and one Technical Officer included above are at present temporary. The temporary Engineer Officer deals with the direction and supervision of the Capital Works Project.

The permanent strength of the subordinate staff (excluding inferior servants) is 74, all of whom are Indians.

Aerodrome Organisation.—This organisation comprises—

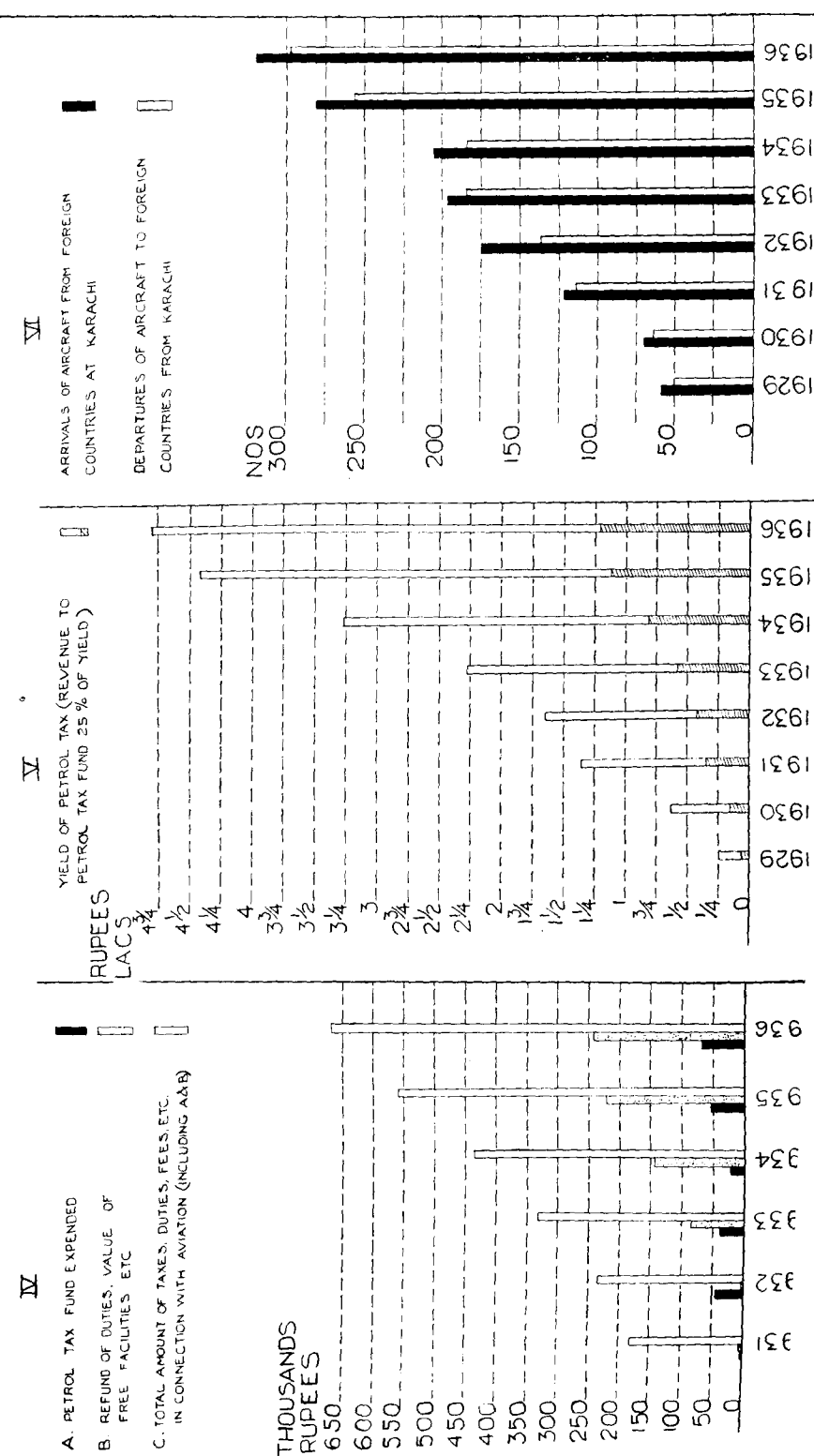
- (a) Office of the Chief Aerodrome Officer at Karachi Air Port.
- (b) 11 Aerodrome Offices at Karachi, Lahore, Delhi, Cawnpore, Allahabad, Calcutta, Jacobabad, Ahmedabad, Bombay, Akyab and Rangoon. (Lahore, Jacobabad, Ahmedabad and Bombay were opened in 1936).
- (c) A number of emergency landing grounds in charge of petty watch and ward staff, and supervised by neighbouring Aerodrome Officers.

The Chief Aerodrome Officer, who is the immediate head of the organisation, is responsible for the control of all aerodrome and route operations. He is also entrusted with the control of aerodrome establishment, the training of aerodrome staff and the operation and maintenance of aerodrome lighting and aerodrome equipment generally.

The Chief Aerodrome Officer has under him a gazetted staff of eight Aerodrome Officers, 20 Assistant Aerodrome Officers and, since 1937, one Electrical and Mechanical Superintendent. Two additional posts of Aerodrome Officer have been sanctioned from the 1st March, 1937, but these have not yet been filled. Six of the present Aerodrome Officers were specially trained in England as Government scholars and the other two were trained in India under the Chief Aerodrome Officer. One Aerodrome Officer is at present attached to the office of the Chief Aerodrome Officer and the remaining seven are in charge of the more important aerodromes, viz., Karachi, Dum Dum, Delhi, Allahabad, Bombay, Akyab, and Rangoon. The Aerodrome Officers are responsible for the proper administration of the aerodromes under their charge, including

To face page 50.

GROWTH OF AVIATION IN INDIA



control of traffic, maintenance of the aerodrome, maintenance and operation of aerodrome equipment, control of expenditure and collection of Government revenue.

The Assistant Aerodrome Officers hold charge of minor aerodromes or assist at important aerodromes, where the amount of traffic necessitates the employment of more than one officer. Four of the Assistant Aerodrome Officers are employed as Officers in charge of the aerodromes at Lahore, Jacobabad, Cawnpore and Ahmedabad. The rest, with the exception of one who is attached to the office of the Chief Aerodrome Officer, are posted to important aerodromes as watch keeping officers. At some of the important aerodromes on the trans-India route, watch keeping hours are extensive and may be expected to extend to 24 hours a day on the trans-India route.

Future recruitment to the grade of Aerodrome Officer will, as a general rule, be made by promotion of suitable officers in the rank of Assistant Aerodrome Officer who have acquired the necessary experience and passed the departmental examination prescribed for the purpose. Recruits for the post of Assistant Aerodrome Officer are usually drawn from the ranks of educated Indians who are qualified pilots. Appointments are made on the recommendation of the Federal Public Service Commission.

The Electrical and Mechanical Superintendent is in charge of all the electrical and mechanical plant at the aerodromes and route lighting. He makes periodical inspection tours of the plant, carries out investigations into breakdowns and makes recommendations to obviate their recurrence. He has control of all electrical and mechanical staff and is generally responsible to the Chief Aerodrome Officer for the efficient conduct of the electrical and mechanical operations in the Department.

Aircraft Inspection.—During the year efforts were concentrated on the recruitment of staff for the expanded organisation which was authorised during 1935. Until quite recently the whole of the aircraft inspection work in India and Burma was carried on by two inspectors and two Indian Assistant Inspectors under training. This necessitated extensive travelling and emergency transfers with great detriment to efficiency and waste of time. In fact, the organisation was quite incapable of dealing with the work. The present organisation consists of :—

A Headquarters Office, which forms part of the Office of the Director of Civil Aviation, in Delhi, in charge of the Chief Inspector of Aircraft, with an Assistant Aircraft Inspector as his assistant.

Four Inspection Offices at Karachi, Calcutta, Bombay and Rangoon (subject to modification on the separation of Burma), in

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charge of Aircraft Inspectors, and three offices in charge of Assistant Aircraft Inspectors at Delhi, Madras and Lahore. (The two offices last named remain to be formed).

The staff authorised and their functions are :—

A *Chief Inspector of Aircraft*, who is responsible for the organisation and administration and the issue of certificates of registration, certificates of airworthiness and ground engineers' licences, as part of the headquarters office functions; and the investigation of accidents through the medium of outstation staff.

Five Aircraft Inspectors in charge of divisions at the offices mentioned above or for employment at headquarters as Assistant to Chief Inspector of Aircraft. These are engineers with long experience of aeronautical engineering and inspection.

Five Assistant Aircraft Inspectors, Grade I, for assistance at Inspection offices or to take charge of minor offices. These are men of long practical workshop experience, which can normally only be found in England at present. Two of these posts are now held by Indians.

Two Assistant Aircraft Inspectors, Grade II, for assistance at Inspection Offices. This grade is reserved for Indian trainees and promotion from the grade below. The appointment is gazetted and the Inspectors take a real part in the work of inspection, while still being trained in their duties. It is probable that the number of posts will increase considerably as suitable Indians become available for appointment.

Six Examiners.—This is a training grade. Recruits are usually drawn from the ranks of qualified Indian Ground Engineers who show promise, as distinct from direct entries to the grade of Assistant Aircraft Inspector, Grade II, who are usually University graduates and who are given *ad hoc* training for the post. Examiners are eligible, after training, for promotion to this grade, and, in due course to higher grades. During their training, examiners are employed on inspection work but without the authority which is vested in the Inspectors.

The actual staff at the close of the year under report, however consisted of :—

- 1 Chief Inspector of Aircraft.
- 2 Aircraft Inspectors.
- 2 Probationary Aircraft Inspectors.
- 5 Assistant Aircraft Inspectors, Grade I.
- 1 Assistant Aircraft Inspector, Grade II.
- 3 Examiners.

i.e., a total of 14 against the authorised number of 19.

The increased opportunities for all grades of aeronautical engineers in England, due to the greatly enhanced aircraft construction programme, have made it extremely difficult to recruit inspection staff having the necessary qualifications. With the invaluable assistance of the Air Ministry, who in spite of their own difficulties in recruitment recognised the importance of the work in India, an officer of the Air Ministry Inspection staff was secured for a period of two years as Chief Inspector of Aircraft, to replace the previous Chief Inspector who had resigned and left India. During the greater part of the year 1936, however, an Aircraft Inspector officiated as Chief Inspector. Of the three Aircraft Inspectors whom it was intended to recruit during 1936, it was only possible to obtain two. Of the five Assistant Inspectors recruited during 1936, four were obtained from outside sources and the fifth post was filled by the promotion of an Indian Assistant Aircraft Inspector, Grade II, who had received training in aircraft inspection duties in England as a Government scholar.

Two selected Indian students are already under training in England for the post of Assistant Aircraft Inspector, Grade II; two more, who have been acting as Examiners during the year, are shortly going to England for training for that grade. Three Examiners whose selection had been made through the Public Service Commission in India in March, 1937, actually joined their appointments early in the next year (1937-38).

It is proposed to appoint an Aircraft Inspector (Engines) who will deal with the special problems arising from the variety of engines now in use by operating companies and clubs. It is also proposed to train in England a specially selected student for Electrical and Wireless duties.

During 1936, three new Inspection Offices were opened, at Bombay, Delhi and Rangoon respectively. It had been intended also to open Inspection Offices at Madras and Lahore, but owing to difficulties in obtaining staff the opening of these two stations has had to be postponed.

The approaching incidence of the Empire Air Mail Scheme with its attendant increase in feeder services to and from the stations on the main route, will require further additions of staff to deal with the increased work. In due course the scheme of training suitable men from specially selected Indian nationals will bear fruit; but meanwhile there is no source from which fully qualified men can be obtained in India.

The increase of stations and staff has called for systematic regulation of the work from headquarters in Delhi, and its co-ordination by uniform regulations intended to assist routine work

while not hampering the officers in charge of stations in making local decisions. Many enquiries on the subject of training and education, interpretation of rules, routine testing of materials, etc., are received from various parts of India, and require dealing with on uniform lines. The concentration of technical information at headquarters avoids a great deal of overlapping and confusion. The increased number of stations has made it possible to deal with the investigation of accidents with less dislocation, since the area for which each Inspector is responsible is smaller. Such investigations take up a considerable time and involve the interruption of all routine work. The Inspection Staff have continued, when required, to carry out assessments of damage to aircraft on behalf of and at the cost of Insurance companies, this being an economical arrangement since the time and cost entailed in travelling to the scene of an accident in India are great.

54 Notices to Aircraft Owners and Ground Engineers were issued during the year 1936.

Administration of Civil Aviation in Burma.—Consequent on the separation of Burma with effect from the 1st April, 1937, the following arrangements for the administration of Civil Aviation in Burma were made at the request of the Government of Burma. The Director of Civil Aviation in India will continue to exercise control over Civil Aviation on behalf of the Government of Burma for a period of 12 months from the 1st April, 1937. The services of Mr. Michael A. Doyle, one of the Government of India Aircraft Inspectors, have been lent to the Government of Burma. He is designated Assistant Director of Civil Aviation. He will deal direct with the Government of Burma and will, during the transitional period, gradually take over all Civil Aviation duties, including inspection of aircraft. The Director of Civil Aviation in India continues to deal with major matters of policy and development.

In connection with the execution of Civil Aviation works in Burma, the Superintending Engineer, Maritime Circle, has been appointed to act as Engineer Officer in liaison with the Assistant Director of Civil Aviation, Burma, and the Director of Civil Aviation in India.

Deputations.—Mr. F. Tymms, C.I.E., M.C., Director of Civil Aviation in India, proceeded on leave for seven months from the 25th April, 1936, and was placed on deputation in England in interruption of leave for the period 28th October to 18th November, 1936, in connection with preliminary discussions with the Air Ministry relating to the Empire Air Mail Scheme. Mr. G. L. Gandy, A.F.R.Ae.S., officiated as Director.

C.—LEGISLATION AND RULES.

The revised Indian Aircraft Rules, 1937, were published for criticism in December, 1936, and were brought into effect on the 24th March, 1937. They superseded the Indian Aircraft Rules, 1920, with the exception of Part IX of the latter. This part which contains the rules for aircraft arriving in or departing from British India (*i.e.*, Customs) will be replaced later by revised rules which are still under consideration.

The new rules are a comprehensive revision of the old rules, and the following are some of the more important changes they introduce :

Carriage of explosives and arms.—It is now permissible for arms and ammunition for private use to be carried as freight.

Prohibited areas.—These are defined in the rules instead of, as heretofore, by a separate Notification. The bulk oil installations at Karachi and Bombay have been excluded from the prohibited areas.

Photography from aircraft.—The restriction is limited only to the photographing of prohibited areas, but in order not to offend the religious and other susceptibilities of the people concerned pilots are still requested to avoid flying low over and photographing sacred places and palaces.

Registration of aircraft.—An important new departure has been introduced. Two categories of registration are now available, one for aircraft wholly owned by British subjects, by persons under His Majesty's protection or by a company or corporation registered within and having its principal place of business within His Majesty's dominions ; the second for aircraft owned by other persons resident in India. Aerial work and public transport activities are reserved for aircraft registered in the first category. Aircraft registered in the second category are not allowed to undertake these activities. This category has been introduced for the convenience of the many foreign subjects and companies in India who may wish to use aircraft for their private purposes.

Qualifications of Personnel.—A number of changes has been made in the qualifications required for the licensing of personnel. 'A' licence pilots have to satisfy certain conditions, including 25 hours flying experience, before they are permitted to carry passengers. The scope of an 'A-1' pilot's licence has been extended to the flying of aircraft by day anywhere in British India (except on a regular scheduled air service) instead of, as hitherto, being restricted to joyriding operations. The conditions of issue have been tightened.

Air-route beacons and Aerodrome lights in British India are now brought under the control of the Government of India and alteration, damage or interference with any such lights is prohibited.

False lights.—Provision has been made for the removal or extinction of false lights which may be either mistaken for an air-route beacon or an air-route light or which, by virtue of their proximity to an aerodrome, might endanger the safety of aircraft.

Aircraft accidents.—Statutory provision is made for the first time for the investigation of accidents. An accident in which any aircraft is involved in British India must be notified to the Director of Civil Aviation in India and to the District Magistrate and the Officer in charge of the nearest Police station, if it involves death or personal injury to any person or serious structural damage to the aircraft, or in the event of fire or failure in the air of any part of the aircraft.

The Director of Civil Aviation in India is empowered to nominate any person to investigate any aircraft accident, and the person so authorised is given powers to summon any person or enforce production of any books, documents or material necessary for the investigation. The Governor-General in Council may, if necessary, constitute a court having the powers of a Civil Court to investigate any accident.

Licensing and Control of Aerodromes.—Provision is made for the licensing of privately operated aerodromes. Government aerodromes available for civil aviation are notified as approved for specific purposes.

Rules of the Air.—These rules are now in accord with the new provisions of Annex D. to the Convention for the Regulation of Aerial Navigation, which were brought into force internationally on 1st April, 1937.

International Commission for Air Navigation.—India was represented at the 24th session of the International Commission for Air Navigation held at Warsaw in May, 1936, by Mr. J. A. Shillidy C.S.I., I.C.S.

Notices to Airmen.—107 Notices to Airmen were issued during the year 1936. The Air Pilot of India and Burma is still under revision.

Instructions to Aerodrome Officers.—The complete revision of the series of Instructions to Aerodrome Officers is also proceeding. The number of such Instructions issued in 1936 was 19.

D.—LICENCES AND CERTIFICATES.

The following table shows comparative figures of the number of new licences and certificates issued in 1935 and 1936 respectively, together with the totals current at the end of each year.

LICENCES AND CERTIFICATES ISSUED AND CURRENT DURING 1935 AND 1936.

Licences and Certificates.	Issued during 1935.	Issued during 1936.	Current on 31st December, 1935.	Current on 31st December, 1936.
Pilots' 'A' licences	104	98	234	227
Pilots' 'A-1' licences (Limited Commercial pilot).	8	6	8	6
Pilots' 'B' licences	20	38	52	62
Pilot Instructors' licences	1	4	13	11
Wireless Operators' licences	2	4	2	6
2nd class Navigators' licences	1	2	2	2
Ground Engineers' licences	30	18	71	73
Certificates of Airworthiness	31	30	66	71
Certificates of Registration	31*	35	110	127

* The figures include only new licences and certificates issued. Licences renewed and aircraft re-registered have been excluded.

Personnel.—The total number of licensed personnel at the end of the year remained substantially level with the figure for 1935, at 387. Although no general increase was registered it is a noteworthy fact that the increase of commercial 'B' pilots and others of the more highly skilled classes of licensed personnel compensates for the reduction in private pilots, and the general upward movement in the commercial classes is continuing at a healthy pace. 'B' licences increased by 10 and while the number of 'A-1' licences was less this was due to the holders graduating up to 'B' licence standard. Another satisfactory sign is the increase in the percentage of Indian licensed personnel from year to year. At the end of 1936 the percentage of Indians had risen to 58·5 per cent. from 56 per cent. in 1935.

An extension is being made of the system introduced for the convenience of pilots whereby all grades of pilots' licences issued by the Government of India may be renewed by Aerodrome Officers. Facilities for renewals are now available at five places, namely: Simla (hot weather), Delhi, Bombay, Calcutta, and Karachi. Other aerodromes are being added to this list, so that wherever there is a flying club in British India, the aerodrome officer on the spot will be authorised to renew all categories of pilots' licences as well as witness tests and assist in conducting technical examinations for licensing purposes.

A new medical centre was opened at Rangoon for the examination of commercial pilots in connection with licensing, and there are now nine such centres in all, viz., Simla (hot weather), Delhi, Karachi, Calcutta, Bombay, Lahore, Lucknow, Madras and Rangoon.

The Principal Medical Officer, Headquarters, Royal Air Force, continues to exercise general supervision over the medical requirements and examinations for civil aviation purposes.

2nd class Air Navigator's licences show no advance over last year's number. The examinations for the Indian licences are held at Karachi concurrently with those at Heliopolis in Egypt, and at London, for the British Air Ministry licences. It is an examination of some difficulty, and demands special application and instruction. The increasing skill which is being constantly demanded of commercial pilots and the improvement in facilities for training in this subject will probably result in more pilots qualifying as navigators in the future.

The development in the use of wireless as a navigational aid to aircraft is leading to a demand for trained and licensed wireless operators and it has become immediately necessary to provide for operators who will be needed next year on the northern section of the Bombay-Madras air mail service, on the inception of the Empire Air Mail Scheme. A reference to the table above reveals that four wireless operators were trained and licensed in 1936 as compared with two in 1935. A satisfactory number is still under training, some of whom are Government-assisted scholars, and an increase is promised in the number of wireless operators licensed during the coming year.

Ground Engineer's licences again show a small increase. It must be remembered that the course of training is long and arduous, and the effects of the training at the Aeronautical Training Centre are not yet due to be felt. The special system introduced in India of permitting newly licensed ground engineers to secure employment and gain experience with a licence endorsed as "valid for operation under approved supervision" has proved extremely valuable in developing the skill and earning ability of these men. At the end of the year, out of 73 ground engineers holding licences, 68 were in active employment, and of the total licensed 45 were Indians.

Aircraft.—There was a small increase in the number of registered aircraft at the end of the year. The number on the register at the end of 1936 was 127 with a total horsepower of 20,104, compared with 110 aircraft with a total horsepower of 17,761 at the end of

1935. The following table shows the number of aircraft of different types and classifications which held certificates of registration and certificates of airworthiness during any part of the year 1936 :—

TYPES OF AIRCRAFT WHICH HELD CURRENT CERTIFICATES OF REGISTRATION AND CERTIFICATES OF AIRWORTHINESS ON THE 31ST DECEMBER 1936.

Types.	Aircraft Registered.					Holding Certificates of Airworthiness.
	Regular Air Services.	Miscellaneous commercial Flying.	Flying Clubs and Training.	Private Flying.	Total.	
D. H. 60 Moth	..	1	16	14	31	17
D. H. 80 Puss Moth	..	..	2	4	6	1
D. H. 82 Tiger Moth	..	..	4	3	7	6
D. H. 83 Fox Moth	5	3	1	..	9	7
D. H. 84 Dragon Moth	3	..	..	3	3	2
D. H. 85 Leopard Moth	1	3	2	2	8	7
D. H. 87 Hornet Moth	..	1	1	..	2	2
D. H. 89 Dragon Rapide	..	..	..	1	1	1
D. H. 90 Dragonfly	..	..	..	2	2	1
Airspeed Courier	..	1	..	..	1	1
Avro Avian	..	..	..	3	3	..
Avro Commodore	..	..	..	1	1	..
Avro X	..	2	..	..	2	1
Avro 642	..	..	..	1	1	1
A. W. XV Atalanta	2	..	..	..	2	2
Blackburn Bluebird	..	..	2	..	2	..
Cierva Autogiro	..	2	..	1	3	..
Comper Swift	..	..	1	1	2	..
Curtis Rambler	..	..	..	2	2	..
Desoutter Monoplane	..	..	..	1	1	..
Heath Monoplane	..	..	..	1	1	..
B. A. Swallow	..	2	4	3	9	7
Miles Hawk	..	..	1	3	4	1
Miles Merlin	2	..	..	..	2	2
Monospar Monoplane	..	..	..	2	2	2
Percival Gull	2	..	..	..	4	4
Short Seion Seaplane	3	..	..	..	3	1
Spartan Cruiser	..	..	..	1	1	1
Stinson Reliant	..	..	..	1	1	1
B. A. C. Super Drone	..	1	..	..	1	..
Flying Flea	..	..	..	4	4	..
Airspeed Envoy	..	..	..	2	2	1
B. A. Eagle	..	..	..	1	1	1
Waco C6	2	..	..	1	3	1
Total 1936	20	16	34	57	127	71
Total 1935	17	14	34	45	110	66

The 56 registered aircraft not holding Certificates of Airworthiness on 31st December, 1936, included those whose certificates were for some reason in abeyance, as well as some of the private aircraft which are not required to be certified as airworthy. Five were of foreign design, out of which three were of such a type that even if they were in new condition they would not be accepted for airworthiness in India; the other two have since been granted Certificates of Airworthiness. Four were Flying Fleas which could not be granted Certificates of Airworthiness.

There were 35 aircraft of 12 different types added to the Register during the year 1936. The total horse-power of these aircraft was 4,992. This represents a greater number and greater horse-power than the additions in 1935—31 aircraft of 4,367 horsepower. The 1936 figures include five Flying Flea types of which one was destroyed and the others withdrawn from use. The numbers and types of aircraft registered is shewn in the following table:—

AIRCRAFT ADDED TO REGISTER 1936.

Number of aircraft.	Type of Aircraft.	Regd. H. P.	Total H. P.
2	D. H. 60 G Moth (Gipsy I)	85	170
2	D. H. 82 Tiger Moth (Gipsy Major)	118	236
5	D. H. 85 Leopard Moth (Gipsy Major)	118	590
1	D. H. 89 Dragon Rapide (Two Gipsy VI).	360	360
2	D. H. 90 Dragonfly (Two Gipsy Major)	236	472
2	Short Scion Senior Seaplane (Four Pobjoy Niagara II).	312	624
4	B. A. Swallow (Pobjoy Cataract III)	80	320
1	B. A. Swallow (Pobjoy Cataract II)	85	85
4	B. A. Swallow (Cirrus Minor)	80	320
1	B. A. Eagle (Gipsy Major)	118	118
1	B. A. C. Superdrone (750 c.c. Douglas)	19	19
3	Waco C6 (Jacobs L-4)	225	675
1	Airspeed Envoy (Two Wolseley Scorpio I).	430	430
2	Airspeed Envoy (Two Wolseley Scorpio II).	480	480
1	Flying Flea (Twin 2/Stroke A/C)	16	16
1	Do. (Scott Flying Squirrel A-25).	16	16
1	Do. (Poinsard)	25	25
1	Do. (Douglas Motor Cycle Engine).	9	9
1	Do. (Heath)	27	27
35			4992

Aerodromes.—As stated earlier in the Report, the revised Indian Aircraft Rules introduce provisions for the licensing of privately operated aerodromes, and the way has been prepared for this change by the issue of a publication under the title “Notes on the Preparation, Licensing and Operation of Aerodromes and Landing Grounds”. This book has been given a wide circulation amongst all those concerned with aerodrome development both in British India and the States and is believed to have proved helpful both in spreading knowledge of the new requirements and in encouraging plans for aerodrome construction in many parts of the country.

Licences are issued in two categories: public and private. The procedure for licensing follows the same general lines as that in connection with the Certificates of Approval for aerodromes formerly issued. Authority will be granted to pilots and others possessing the requisite knowledge and experience to act as approved inspectors of aerodromes, and their report may be accepted as evidence that an aerodrome complies with the prescribed safety requirements and is fit to receive a licence.

In the case of a site under development as a permanent aerodrome, the responsibility may be placed on an approved inspector for recommending such works to be carried out as he may consider necessary before a licence is granted, and where his experience and qualifications justify this course his certificate may be accepted that the completed aerodrome is fit for public use subject to such special conditions as he may recommend.

A relaxation of the procedure is made in the case of temporary sites to be used for short periods for joyriding purposes, so that it is possible for operations to commence immediately a landing ground has been inspected and certified by an approved inspector, subject to the prescribed conditions being carried out and the recommendations of the approved inspector being strictly observed.

Under the present arrangement between the Government of India and the Indian States for the control of Civil Aviation in India, the States may approve their own aerodromes. Almost invariably, however, States desirous of constructing landing grounds seek the advice of the Director of Civil Aviation. The State Engineers concerned have each been supplied with the aerodrome publication mentioned above and in many instances they are guided by the technical advice of one of the approved inspectors. Before information regarding a State aerodrome or landing ground is published in the Air Pilot—India and Burma or in a Notice to Airmen, the Director of Civil Aviation must be satisfied that it complies generally with the standards of safety enforced in British India.

E.—CUSTOMS AND HEALTH SERVICES.

The large increase of traffic through Karachi Air Port has involved continuous development of the work of the Customs and the Health services and this work will expand still more with the triplification of the K. L. M. services from October, 1937, and the introduction of the Empire Air Mail Scheme at the end of the year.

The growth in traffic will be gathered from the figures in Appendices 2 and 3. 614 aircraft were cleared by the Customs at Karachi Air Port on arrival or departure, as compared with 538 in 1935, passengers on scheduled services numbered 1,737 as against 1,367 and goods imported and exported amounted to Rs. 82,55,356 as against Rs. 36,68,241.

Measures have been taken to protect India from the risk of the introduction of Yellow fever by aircraft arriving from Africa. The Government of India issued a Notification on the 16th September, 1936, placing certain restrictions on aircraft and passengers by air arriving in India within nine days from infected or suspected Yellow fever areas. From October, 1936, the fumigation of aircraft was commenced at the Karachi Air Port. Imperial Airways aircraft that fly on the African route may sometimes be employed on the route to India and the company's machines were therefore almost regularly fumigated. The Dutch and French air lines were exempt from fumigation as they do not fly near Yellow fever areas, although the precaution was taken to search every aircraft arriving from the west for mosquitoes and other insects.

Draft rules based primarily on the International Sanitary Convention, with alterations to suit local conditions, were published on 30th July, 1936, for the information and criticism of the public and are now under the consideration of the Government of India before final promulgation.

The health organisation at the Karachi Air Port consists of an Airport Health Officer, a sub-assistant surgeon, with the necessary sanitary, clerical and menial staff. All passengers and crews that arrive at and depart from Karachi are inspected, and Bills of Health are issued to westbound aircraft in accordance with the International Sanitary Convention. The following table shows the number of Bills of Health issued and the number of aircraft, crews and passengers inspected during the year 1936 :—

	Total.
<i>Westbound—</i>	
Bills of Health issued	285
Crews inspected	1,052
Passengers examined	1,324
<i>Eastbound—</i>	
Aircraft inspected	304
Crews inspected	1,092
Passengers examined	1 084

Quarantine accommodation at Karachi Air Port has become essential and the construction of an Isolation Hospital was put in hand shortly after the close of the year. A survey of the mosquito breeding areas in and around the Karachi Air Port has been made and necessary steps taken to prevent breeding.

In the beginning of the year 1936, at the request of the Chief Aerodrome Officer, the Air Port Health Officer at the Karachi Air Port gave instruction to two Aerodrome Officers in First-Aid and Hygiene. Later the Government of India established the principle of making the Health Officer at the Air Port responsible for the instruction of Aerodrome Officers in these subjects. The instruction comprises eight lectures on First-Aid and ten lectures in Hygiene. The candidates were instructed in two batches and during the year twenty candidates passed the examination and obtained certificates issued by the St. John Ambulance Association.

SECTION V. ACCIDENTS.

A.—GENERAL ANALYSIS.

During the year 1936, 25,905 hours' flying were carried out by aircraft of Indian Registration (excluding the time flown by aircraft used entirely for private purposes) compared with 27,325 hours flying in 1935.

30 notifiable accidents were recorded in 1936 compared with 22 in 1935. Notifiable accidents under the Indian Aircraft Rules are those resulting in death or injury and/or serious structural damage such as breaking of main spars or controls or damage by fire during operation. The number of accidents compares unfavourably with those occurring in 1935, but fortunately the fatalities resulting were only two in 1936 against 16 in 1935, and beyond this only four accidents resulting in more than minor injuries are recorded. Of the machines involved in accidents eight were written off as a result, eight required complete overhaul, 12 required the replacement of a major component, and two sustained only minor damage.

The analysis and distribution of accidents in India is given in Appendices 15, 16 and 17 on pages 90—94, and the following facts are worthy of special note:—

Of the total of 30 accidents, two occurred to aircraft of non-Indian registration in transit; five to aircraft on regular air services; three in miscellaneous commercial flying; sixteen to flying club aircraft; and four in private flying. Both fatal accidents occurred on club aircraft.

The number of miles flown for each accident to Indian aircraft was 82,800 compared with 125,200 in the previous year. In regular air transport the number of miles flown per accident was 187,000 compared with 211,000 in 1935.

The number of miles flown per fatality in 1936 was 1,159,000 compared with 170,000 in 1935. In regular air transport there were no fatal accidents in 1936 in a total mileage of 936,000 while in 1935 the number of miles flown per fatality was 422,000 (One fatal accident involving two deaths).

B.—NATURE OF ACCIDENTS.

The following analysis of the causes of accidents to Indian registered aircraft in 1936 is based on the N. A. C. A. form of

Report No. 357. Comparison is made with the three preceding years.

Class.	Nature of Accident.	1936.	1935.	1934.	1933.
A.	Collision in full flight with other aircraft.	..	1	..	..
B.	Collisions in full flight with objects other than aircraft.	6	2	3	2
D.	Spins or Stalls without engine failure.	..	4	5	5
E.	Forced Landings . . .	6	3	1	2
F.	Landing accidents . . .	10	4	3	8
G.	Take-Off accidents . . .	5	2	6	4
H.	Taxying accidents . . .	1	1	2	1
N.	Structural Failure . . .	..	1	..	..
Y.	Indeterminate and doubtful	..	1	..	..

It will be noted that the great majority of accidents occurred during landing (voluntary), forced landing or while taking off. The two fatalities which occurred during the year come under class B.

In one case the pilot of a flying club machine was carrying out manoeuvres at very low altitude apparently trying to find the aerodrome during misty weather and flew into the Ganges.

In the other case the pilot of a flying club machine was flying at about 5,000 feet and flew directly into the ground in a steep dive. The cause of the latter accident, after exhaustive inquiry, remains undetermined.

The analysis of the nature of accidents given above covers 28 accidents, the total notifiable accidents being 30. The remaining two accidents occurred to aircraft not on the Indian register. Of these one occurred to a French aircraft which was damaged in landing owing to one leg of the retractable undercarriage sticking. No injury to personnel resulted. The other occurred to an aircraft on the British register which caught fire during the operation of starting up by compressed air supplied in cylinders. The cylinder which was being used contained oxygen. The aircraft was completely destroyed. No injury to personnel occurred. Regulations providing against a recurrence of such an accident were immediately introduced.

SECTION VI.

PROGRESS IN THE INDIAN STATES.

In all branches of civil aviation activity—the flying clubs, private flying, aerodrome construction, the use of air survey, and now air transport—the Indian States are taking an increasingly active part and it has this year become necessary to open a separate section of the Report to record their progress.

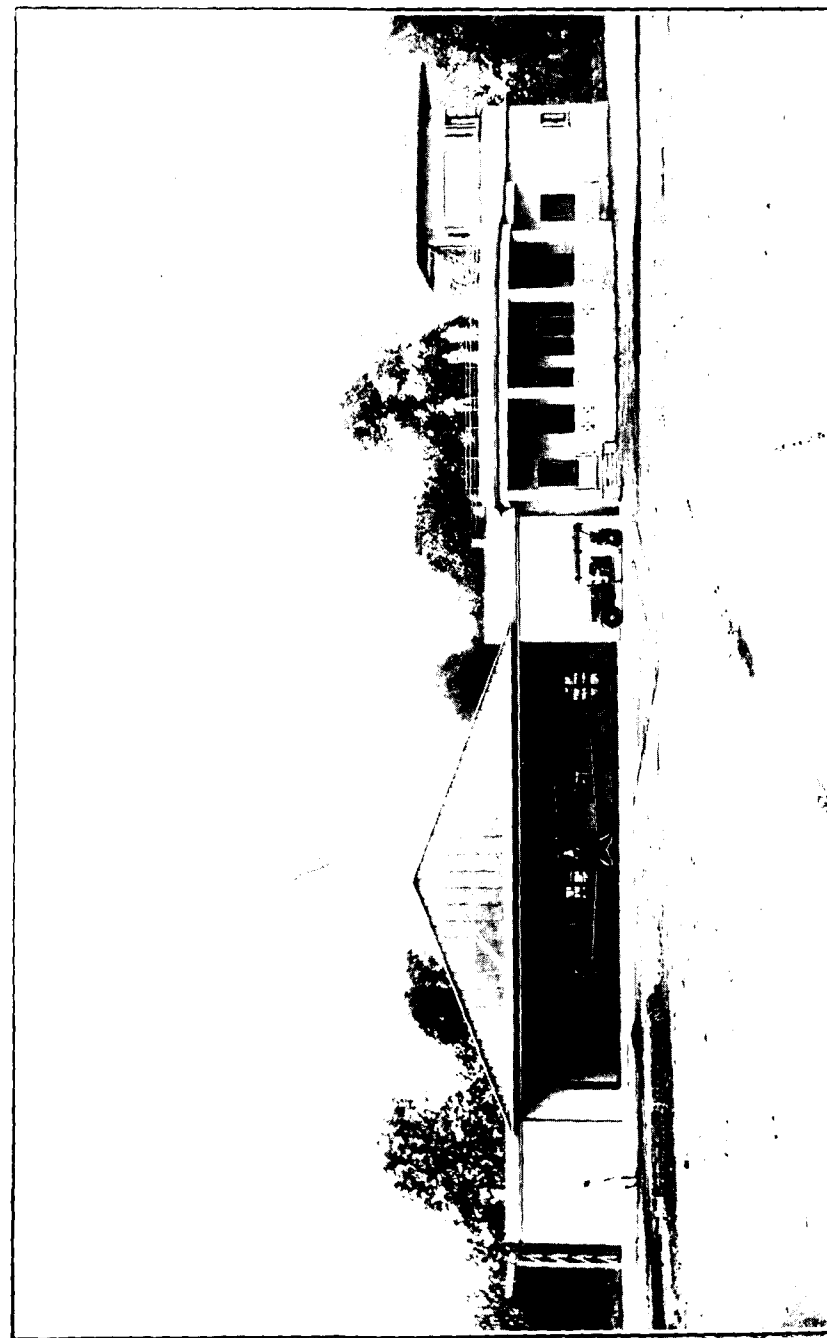
The period of planning and preparation through which civil aviation as a whole has been passing has found the State authorities ready and anxious to participate, and with the example of Jodhpur before them they have made considerable strides in the employment of aircraft and the creation of ground facilities. As already mentioned in earlier pages, three States, Jodhpur, Jaipur and Hyderabad, have flourishing flying clubs, 55 aerodromes or landing grounds have been constructed in State territories and more are in course of preparation, while the Ruling Princes or Chiefs possess 21 private aircraft.

Several States, now possessing a well-established aviation organisation, with aerodromes, equipment and a nucleus of trained staff, are turning their attention to the possibilities of regular air transport services. Others are considering the grant of financial assistance to air transport companies to encourage them to run services to the State. Others again, more fortunately placed, are co-operating with the Government of India in order to gain the benefit of having a seaplane base for the Empire flying boats within their territories.

This spirit of development owes its existence and driving-force to a very large extent to the personal interest taken in flying by a number of the Ruling Princes, whose foresight and keen attention to aviation have opened the way for air transport to advance with advantage to their States.

H. H. the Nizam's Government is the first to make plans for a system of air transport to link up the chief cities of the State by air, as well as to serve the main air routes radiating from the State to the principal cities of India. The States of Gwalior, Bhopal and Indore are interested in the plans of Tata Sons, Ltd., for an air service between Bombay and Delhi, connecting at Gwalior and Delhi respectively with the flying boat and landplane services of the main Empire air mail routes. The Kathiawar States of Cutch, Nawanagar, Porbandar and Rajkot are exploring a scheme proposed by Air Services of India, Ltd. for an air link with Bombay. The Travancore State is already supporting the Bombay-Trivandrum service operated by Tata Sons Ltd., and this service may

To face page 66.



MAYURBHANJ (Baripada) Aerodrome.—The hangar and Rest-house constructed by The Maharaja of Mayurbhanj, who has qualified as a pilot.

possibly in future be extended to make connection at Trichinopoly with the mail service to Colombo. The Government of Kashmir and Jammu is giving consideration to the possibilities of a service between Srinagar and Lahore, where it would connect with the Lahore-Karachi air mail service operated by Indian National Airways, Ltd.

Several other projects have been raised and may be expected to make headway as internal development gathers strength, while the establishment of further main air routes in the future, as for example the Bombay-Calcutta and Madras-Calcutta routes, must in their turn lead to wider opportunities for developments on the part of States which see an advantage in co-operation.

Close co-ordination and consultation is maintained between the Directorate of Civil Aviation and the authorities concerned with civil aviation in the States on all matters of technical and operational interest. For example, advice is given to the States with regard to such matters as the organisation of flying clubs and the planning and control of aerodromes and air routes; arrangements may be made for probationary Aerodrome Officers in the employ of States to be trained on their behalf at the Karachi Air Port; special Wireless and Meteorological facilities may be organised in conjunction with the States for the service of main air routes; and assistance is given with technical information and advice on all aspects of aircraft operation.

The following is an outline based on reports received from the States of the more important activities in civil aviation during the year.

1. **Bhopal.**—The State has constructed a temporary landing ground at Bhopal which has been used occasionally. A proposal for a permanent landing ground is under consideration and the State has entered into a contract with Messrs. Tata Sons Ltd. for the operation of a bi-weekly service from Bombay to Delhi *via* Bhopal.

2. **Bikaner.**—The State maintains two aerodromes, one at Bikaner and the other at Gajner; the latter is for private use and is intended for guests who arrive by invitation. A proposal to improve the aerodrome at Bikaner is under consideration.

3. **Cutch.**—The Durbar have entered into an agreement with Messrs. Tata Sons Ltd. by which the Karachi-Madras air mail service will stop at the Bhuj aerodrome and have expressed themselves as willing to do all in their power to promote the ease and safety of the route crossing their territory. Steps are being taken by the Durbar for the improvement of the Bhuj aerodrome and it is understood that the plans being considered include the provi-

sion of runways and a night lighting installation. Enquiries have also been made by the State as to the possibility of installing an aeronautical wireless station. The India Meteorological Department upper air observatory from Bellary has been transferred to Bhuj.

4. **Dharampur.**—Dharampur State has provided a landing ground near its capital. Passenger flights were arranged during the early part of the year 1937 and a large number of people had their first experience of flying.

5. **Dholpur.**—A landing ground has been provided in Dholpur for the use of State guests and visiting aviators.

6. **Gwalior.**—At the desire of the State authorities the Madho Sagar Lake at Gwalior has been selected as a permanent seaplane base on the trans-India section of the Empire Air Mail service from England to Australia and an agreement has been reached with the Government of India under which the provision of shore facilities will be undertaken primarily by the State. An aeronautical wireless station will be installed by the Government of India. Plans are under consideration for the construction of an aerodrome at Gwalior and when completed this will be used by the Bombay-Delhi air service to be operated by Tata Sons, Ltd.

7. **Hyderabad.**—Civil Aviation in the State is controlled by a Civil Aviation Board consisting of eight members, comprising officials and prominent citizens of the State. A capital expenditure of Rs. 5½ lakhs has been sanctioned for the facilities now completed or nearing completion, and in addition a subsidy has been granted to the State Aero Club. The hub of the ground organisation is the Begumpet Airport, within easy reach of the great business centres of the State—Hyderabad and Secunderabad. The airport is being fully equipped for night and day operations and is now in regular use by the Karachi-Madras air mail service.

The control building, for which the foundation stone was laid by Her Highness the Princess Durrue Shehvar Dulhan Durdana Begam Saheba on the 4th November 1936, is complete in its first stage, which includes control room, offices, pilots' accommodation and refreshment rooms.

A ground organisation has been planned with a view to meeting all requirements for some years to come. The co-ordination of road, rail and air transport has received serious consideration. Surveys have been made for subsidiary aerodromes at six district headquarters in the State and also for emergency landing grounds at suitable places on the main air route between Hyderabad and important centres in British India.

The State Aero Club has a membership of 41 of whom 28 are flying members. It possesses two Tiger Moths and may obtain a third. A successful flying Gymkana was held by the Club in connection with the laying of the foundation stone of the airport.

8. **Idar.**—The year saw aviation being accepted by the Ruling Family of Idar as a method of fast, comfortable and dust-free transport. The State has a first-class landing ground at Himatnagar, with a well-equipped workshop attached to it. New engines were installed in the Monospar aircraft of His Highness and the machine was flown for about 38 hours piloted by the Maharaja Madan Singhji. The Ruling Family take a very keen interest in civil aviation and the Bara Maharaja Kumar Saheb is taking flying instruction at the Bombay Flying Club.

9. **Indore.**—Arrangements have been completed with Tata Sons Ltd., for the establishment of an air service between Bombay and Delhi *via* Indore.

The question of an Aerodrome at Indore was considered as early as 1933 and after various proposals and sites had been examined a site was selected at Bijasani Hill about four miles from Indore. An excellent landing ground was completed by May 1936 at a cost estimated at Rs. 2,20,483. An interesting feature of the construction of this aerodrome was a reversal of the usual process of building up a hard surface on the native soil. A top layer of the ubiquitous and unstable cotton soil was removed, leaving a uniform surface of stable laterite. The operation has proved entirely successful. A reinforced concrete cement hangar at a cost of Rs. 38,000 is nearing completion and another hangar of steel will be completed shortly.

The State purchased two aeroplanes and engaged a pilot and ground engineer during the year. The first machine, a 5-seater "Dragonfly", has arrived from England and the second, a 7-seater Airspeed "Envoy", is expected shortly.

Two State scholars are at present undergoing training in aviation—one at Karachi as pilot and ground engineer and the other at Delhi as pilot.

10. **Jaipur.**—His Highness the Maharaja made several flights in his Airspeed "Envoy" totalling 35 hours during the year 1936. An order for a Tiger Moth for the Jaipur State Aero Club was placed in England and the machine is now in service.

Two appointments—a State pilot and a ground engineer—have been made. The former acts as instructor to the flying club, which began active work in March 1937.

The State completed landing grounds at Malpura, Sawai Madhopur, Jhunjhunu and Isarda during the year. Another landing ground is in preparation at Ramgarh. The Sanganer aerodrome is being rebuilt and provided with runways. A small workshop has been constructed for emergency repairs and plans have been drawn up for other aerodrome buildings.

11. **Jind.**—The Jind Infantry Parade Ground at Sangrur has been equipped as a landing ground.

12. **Jodhpur.**—Jodhpur is one of the main aerodromes on the trans-India route and has been used regularly since 1930 by the three companies operating services across India, viz.—Indian Trans-Continental Airways and Imperial Airways Ltd., K. L. M. and Air France. During the year 761 aircraft landed at the aerodrome.

To complete the night lighting equipment, 26 electric boundary lights were installed on the perimeter of the landing area during the year 1936. The lighting equipment now consists of two floodlights, an airway beacon installed on the State Hotel, an illuminated wind indicator, electric boundary lights, and electric obstruction lights on all the buildings in the vicinity of the aerodrome.

Amongst other works of general improvement completed during the year were the following:—

- (i) Two runways in the direction of prevailing winds (North-East—South-West, North-West—South-East).
- (ii) A Macadam surface covered with Shelsheet near the Control Tower Buildings.
- (iii) A masonry drain along the edge of the Shelsheet surface for about half its length to drain storm water away outside the aerodrome and thus to prevent the landing ground from becoming saturated.
- (iv) A building, $1\frac{1}{2}$ miles south of the aerodrome, has been completed for the new direction-finding station on the Adcock system to be installed by the Government of India.

In the districts the number of landing grounds was increased to 18 by providing three new landing grounds at Phalodi, Sheo and Parbatsar. These landing grounds are largely used by the State officials during their tours by air.

At the end of the year the number of members of the Jodhpur Flying Club was 49 including seven honorary and six associate members. There were 12 European and 14 Indian flying members. The total flying done by the club during the year was 883½ hours. At the beginning of the year the club had two Tiger Moths and one

Leopard Moth. In addition the three private aircraft of His Highness the Maharaja were also maintained by the club.

An “at home” and flying meeting was held in connection with the presentation of a Leopard Moth to His Highness by Rai Bahadur Seth Bhag Chand Soni, M.L.A., of Ajmer. A fly-past of aircraft was led by His Highness and was followed by aerobatic displays by the pilot-instructors of the Karachi and Jodhpur Clubs. A landing competition was also organised in which seven *ab initio* pilots trained by the club took part. The winner was Lt. Col. Sir Donald Field, Kt., C.I.E., Chief Minister, who was awarded a silver cup presented by His Highness.

Photographs illustrating the control building and large hangar at the aerodrome appear facing page 6.

13. **Junagadh.**—The State owns a two-seater Gipsy Moth which is used for official purposes. The principal landing grounds are at Junagadh and Veraval and there are provisional landing grounds at Bhesan, Keshod, Una, Kutiana, Talala, Bherai and Nageshri, which can be used during the dry season only. Junagadh was one of the first States to purchase an aeroplane, prepare an aerodrome and employ a State pilot.

14. **Kashmir.**—During the year 1936 the work on the construction of the aerodrome at Srinagar (Damodar Karewa) was continued. The landing ground was completed and buildings comprising a hangar, His Highness' suite of rooms, workshop, etc. were nearing completion. A small hangar for His Highness' aeroplanes was also built at the Military Parade Ground at Satwari, Jammu.

His Highness made a number of journeys by air during the summer of 1936.

15. **Kolhapur.**—The Durbar has been in correspondence with the Indian Aviation Development Co. of Bombay regarding the possibility of an air service between Bombay and Bangalore, passing through the State. The company are understood to have selected two or three sites for landing grounds in the State. Further progress is expected during the year 1937-38.

16. **Limbdi.**—The aerodrome at Limbdi was maintained in good condition for light aeroplanes during fair weather. Prince Ghanshyam Singhji of Limbdi has a private Autogiro in which some flying was done during the year.

17. **Loharu.**—The landing ground at Loharu has been extended and relevelled during the year and is now being maintained in good condition. The State has given permission to the Delhi Flying Club to use the landing ground for cross-country flying without previous sanction. Machines of the Club, of Indian

National Airways, Patiala State, and many other small private machines landed at Loharu during the year.

18. **Mayurbhanj**.—A D. H. Tiger Moth was purchased by the State and was assembled by Indian Air Survey and Transport, Ltd., of Calcutta. It was delivered in October, 1936, and has been used for occasional flying between Dum Dum and Baripada. A five-seater D. H. Dragonfly arrived in January, 1937, and was taken into use by February, 1937.

The Maharaja Sahib commenced taking flying instruction at Dum Dum in December, 1936, and made his first solo flight in January, 1937.

The aerodrome at Baripada has been completed in every respect and is equipped with a hangar, a rest-house and a combined store and workshop. A photograph of the hangar and rest house appears facing page 66.

19. **Nawanagar**.—The landing ground at Nawanagar has been improved. There were 30 arrivals and departures of visiting aircraft during the year. The scheme for an air service to the Kathiawar States submitted by Air Services of India, Ltd., is under consideration.

20. **Panna**.—A landing ground about seven miles from Panna is kept ready for aircraft when prior intimation is received. There were a few arrivals and departures during the year.

21. **Patiala**.—His Highness the Maharaja of Patiala maintains three aeroplanes, a Spartan Cruiser, a Percival Gull and a Monospar, and for some years has employed a State pilot. The total amount of flying done by these machines during the year was 260 hours. All the three aeroplanes were flown on cross-country flights on personal or State business. One machine was placed at the disposal of the Officiating Director of Civil Aviation for a tour of Burma during 1936. A programme of development of landing grounds in the State is under consideration.

22. **Phaltan**.—The Durbar is considering proposals for a landing ground. A site has been selected and further progress is expected in the coming year.

23. **Porbandar**.—The aerodrome at Porbandar has been equipped with a hangar and a guard-room where a permanent guard is posted and a telephone has also been provided. The State had the honour of a visit by air from His Excellency the Viceroy and the Viceregal Party on the 20th January, 1936. In addition, the Thakore Sahib of Limbdi and many other distinguished visitors arrived by air to the State. The State has entered into arrangements with Air Services of India, Ltd., for the Company's proposed Bombay-Kathiawar service to call regularly at Porbandar.

24. **Radhanpur**.—A temporary aerodrome near Fatehkot Bangalow was maintained by the State during the year.

25. **Rajkot**.—A landing ground is maintained suitable for the landing of all types of aeroplanes. The State proposes to grant an annual subsidy for a period of three years to Air Services of India, Ltd., in connection with the air service from Bombay to the Kathiawar States. Rajkot being the centre of the Western India States Agency expects a large traffic by air to and from the State on this service.

26. **Rajpipla**.—A flying club is being formed and an inaugural ceremony was performed by the Maharaja in January, 1937, when the pilot-instructor of the Bombay Flying Club visited the State with three machines from the club. An aerodrome has been prepared and it is hoped that flying activities will be much in evidence in the State during the year 1937-38.

27. **Rampur**.—The Parade Ground in the Military Lines at Rampur is used as a landing ground. Since the inauguration of the sugar factories in the State, the directors of the factories often use aircraft to visit their factories at Rampur.

28. **Sirohi**.—There are two landing grounds in the State, one at Sirohi, approved for all types of aircraft and the other at Abu Road which is approved for light aircraft. Six machines utilised the Sirohi landing ground and four the one at Abu Road.

29. **Travancore**.—Travancore is one of the few States in India that has a direct connection by air with the Empire Air Mail services. The Bombay-Trivandrum service is operated by Tata Sons, Ltd., during the non-monsoon months under an agreement with the State. Details and statistics of this service have already been mentioned in Section I.

There are two landing grounds in the State at Trivandrum and Quilon respectively. Members of the Bombay and Madras Flying Clubs have visited these landing grounds, as have also others for business purposes in the State and adjoining territories.

30. **Udaipur**.—The Rajsamand Lake in the State has been selected provisionally as one of the stops on the trans-India seaplane route and thus from the year 1937-38 Udaipur will have the distinction of being a station on the main Empire route from England to Australia. Shore facilities at the seaplane base are being provided by the State.

The landing ground at Udaipur is maintained in serviceable condition except during the monsoon months. A small hangar was built during the year.

31. **Wankaner**.—The State granted a scholarship of Rs. 8,000 to Mr. Premchand S. Sanghvi, a native of Wankaner, for a course of instruction in flying for the purpose of obtaining a 'B' licence.

AERODROMES AND LANDING GROUNDS IN INDIAN STATES.

A list of the aerodromes and landing grounds of which details had been received from Indian States up to the end of 1936 is given below. It is known that additional grounds have been prepared during the year and since, but particulars of these have not yet been received. There are probably a further 15 grounds to be added to this list, making a total of 70 as on 31st March 1937.

*State.	Aerodromes and landing grounds normally maintained in good condition.	†Other landing grounds.
Aumdh	1	..
Mayurbhanj	1	..
Bhopal	..	1
Bikaner	2	..
Bhuj	1	..
Dharampur	1	..
Dholpur	1	..
Hyderabad	..	2
Idar	1	..
Indore	..	1
Jodhpur	13	..
Jaipur	4	3
Junagadh	2	..
Jind	1	..
Kolhapur	..	1
Kashmir	..	2
Limbdi	1	..
Loharu	1	..
Nawanagar	1	..
Patiala	1	1
Panna	1	..
Porbandar	1	..
Radhanpur	..	1
Rajkot	..	1
Rampur	..	1
Rewa	..	1
Sirohi	1	..
Travancore	2	..
Udaipur	1	..
Wankaner	..	1
	38	16

* Permission to use the landing grounds in certain States is subject to application being made in advance.

† This list includes grounds which may not necessarily be maintained in good condition or may be of a temporary nature.

APPENDIX 1.

Air Mails carried by all Scheduled Air Services to and from India.

(1) Air Mails to India.

	Imperial Airways and Indian Trans-Continen- tal Airways, Ltd.		K. L. M.		Air France.		Total.
	From the West.	From the East.	From the West.	From the East.	From the West.	From the East.	
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1929 (9 months) .	21,967	..	..	..	..	..	21,967
1930	39,364	..	96	..	..	..	39,460
1931	45,632	..	1,047	No record.	318	No record.	46,997
1932	45,111	..	3,216	1,366	458	79	50,230
1933	55,195	No record.	4,731	1,319	834	268	62,347
1934	65,795	1,395	4,977	4,454	936	588	78,145
1935	90,297	5,791	7,111	6,896	747	655	111,497
1936—							
March quarter	25,388	3,374	2,562	442	192	173	32,131
June quarter .	23,243	3,657	2,380	429	280	175	30,164
Sept. quarter .	25,378	4,878	2,662	482	244	171	33,815
Dec. quarter .	31,692	5,356	2,734	488	385	217	40,872
Total for 1936 .	105,701	17,265	10,338	1,841	1,101	736	136,982

(2) Air Mails from India.

	Imperial Airways and Indian Trans-Continental Airways, Ltd.		K. L. M.		Air France.		Total.
	To the East.	To the West.	To the East.	To the West.	To the East.	To the West.	
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1929 (9 months) .	..	20,171	..	..	..	..	20,171
1930	..	34,015	..	..	..	..	34,015
1931	..	40,474	..	..	..	..	40,474
1932	..	42,407	117	..	14	..	42,538
1933	No record.	54,178	1,460	..	424	..	56,062
1934	3,537	66,753	428	47	586	108	71,459
1935	6,677	93,859	57	111	1,087	124	101,915
1936—							
March quarter .	2,128	24,576	23	35	315	23	27,100
June quarter .	2,767	24,453	29	38	151	19	27,457
Sept. quarter .	3,368	28,554	30	54	113	28	32,147
Dec. quarter .	3,522	30,009	33	9	98	63	33,734
Total for 1936 .	11,785	107,592	115	136	677	133	120,438

NOTE.—The form of this Appendix has been modified. It now excludes transit mails and shows only mails originating in or destined for India.

APPENDIX 2.

Flights performed and Passengers and Freight carried by all Scheduled Air Services to and from India.

(i) Karachi Air Port.

	*No. of flights.	Passengers.		Freight (including bullion).	
		To India.	From India.	To India.	From India.
<i>Imperial Airways.</i>				lbs.	lbs.
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	105	150	142	5,073	266
1933	109	216	211	9,410	5,029
1934	104	280	326	10,232	4,988
1935	208	455	528	23,811	31,560
1936—					
March quarter	52	82	125	3,954	4,792
June quarter	53	86	178	4,318	7,470
September quarter	52	156	166	4,183	3,999
December quarter	53	126	100	4,850	7,130
TOTAL for 1936	210	450	569	17,305	23,391
<i>Foreign Air Services.</i>					
1931	106	32	18	628	43
1932	190	16	30	1,231	2,686
1933	222	59	64	4,045	380
1934	209	31	71	7,662	780
1935	266	186	198	9,388	4,179
1936—					
March quarter	78	50	76	2,467	1,325
June quarter	77	62	122	2,130	997
September quarter	79	99	115	3,015	1,532
December quarter	78	103	91	2,698	1,298
TOTAL for 1936	312	314	404	10,310	5,152

* Duplicate services not included.

APPENDIX 2.—contd.

Flights performed and Passengers and Freight carried by all Scheduled Air Services to and from India—contd.

(ii) Rangoon Air Port.

	*No. of flights.	Passengers.		Freight.	
		To India.	From India.	To India.	From India.
<i>Imperial Airways and Indian Trans-Continental Airways.</i>					lbs.
1934 (December quarter only).	2	..	3	..	..
1934	105	45	55	2,249	5,361
1935	130	52	46	3,696	3,909
1936—					
March quarter	52	33	27	1,173	1,761
June quarter	53	25	22	1,729	2,911
September quarter	52	14	16	2,564	4,057
December quarter	53	20	16	817	2,177
TOTAL for 1936	210	92	81	6,283	10,906
<i>Foreign Services.</i>					
1932	190	41	28	128	1,351
1933	212	108	77	100	34
1934	208	42	27	4,346	6,061
1935	265	86	56	285	861
1936—					
March quarter	78	50	46	73	126
June quarter	77	30	25	75	191
September quarter	79	26	21	45	79
December quarter	78	54	28	69	519
TOTAL for 1936	312	160	120	262	915

* Duplicate services not included.

APPENDIX 3.

Value of Imports and Exports by Air—Karachi and Rangoon Air Ports.

	Aircraft.*		Imports by Air.				Exports by Air.			
	Arrivals from foreign.	Departures for foreign.	General merchandise.	Precious stones.	Bullion and currency notes.	General merchandise.	Precious stones.	Bullion and currency notes.		
			Rs.	Rs.	Rs.	Rs.	Rs.	Rs.		
<i>Karachi.</i>										
1931	122	111	1,50,601	..	1,06,801	4,286	..	10,00,000		
1932	174	161	4,09,256	4,17,722	33,766	15,128	..	2,00,000		
1933	197	184	19,07,929	31,48,685	1,77,335	44,206	..	1,02,700		
1934	192	183	5,25,941	38,78,355	1,66,638	10,026	52,983	1,03,930		
1935	278	260	8,31,480	25,08,941	1,23,635	80,935	77,350	45,900		
1936—										
March quarter	77	71	1,22,419	13,84,912	..	23,000	..	..		
June quarter	84	81	1,78,247	21,44,709	865	22,389	1,500	23,889		
September quarter	71	70	2,22,181	17,03,743	1,55,605	33,410	12,700	4,200		
December quarter	85	75	2,64,547	17,94,139	16,329	32,682	9,000	1,04,900		
Total for 1936	317	297	7,87,384	70,27,503	1,72,799	1,11,481	23,200	1,32,989		
<i>Rangoon.</i>										
1931	57	65	..	..	..	..	..	4,54,700		
1932	96	107	1,808	..	..	225	..	22,58,563		
1933	119	118	3,697	..	..	..	..	..		
1934	172	182	9,890	..	..	612	..	..		
1935	208	220	27,056	..	..	625	..	..		
1936—										
March quarter	67	67	3,936	..	..	25	..	..		
June quarter	67	64	1,332	..	..	2	..	..		
September quarter	68	71	17,693	..	..	203	..	..		
December quarter	72	73	2,694	..	..	21	..	..		
Total for 1936	274	275	25,655	..	..	251	..	..		

APPENDIX 4.

Regularity and punctuality of scheduled air services to and from India—Karachi Air Port.

Services and Period.	Eastbound Arrivals.				Westbound Departures.						
	Sche- duled.	Punc- tual.	Delay.			Sche- duled.	Punc- tual.	Delay.			
			1 day.	2 days.	3 days or more.			1 day.	2 days.	3 days or more.	
1931—											
Imperial Airways	52	35	8	6	3	53	43	6	3	1	
K. L. M.	26	16	5	2	3	24	18	5	..	1	
Air France	18	13	3	2	..	17	13	3	1	..	
1932—											
Imperial Airways	53	36	6	7	4	52	50	1	..	1	
K. L. M.	52	32	13	6	1	51	43	6	3	..	
Air France	43	33	7	3	..	43	31	8	3	1	
1933—											
Imperial Airways	52	45	4	2	1	52	50	..	2	..	
K. L. M.	52	36	12	3	1	53	49	2	2	..	
Air France	52	42	8	2	..	52	49	2	..	1	
1934—											
Imperial Airways	52	44	8	..	..	52	46	5	1	..	
K. L. M.	53	49	4	..	..	52	49	3	..	..	
Air France	52	35	10	6	1	52	47	3	..	2	
1935—											
Imperial Airways	104	87	13	2	2	104	91	10	1	2	
K. L. M.	81	63	10	5	3	81	76	2	1	..	
Air France	53	40	13	..	..	52	45	6	1	..	
1936—											
Imperial Airways	105	62	34	4	5	105	94	9	..	4	
K. L. M.	103	91	10	1	1	104	100	..	4	..	
Air France	52	39	11	2	..	53	53	..	..	..	

APPENDIX 5.

Air Mails carried by Trans-India Air Service. Imperial Airways, Ltd. and Indian Trans-Continental Airways, Ltd.

Period.	East bound.					West bound.					*Grand Total.
	To India and Burma from the West.	From India and Burma to the East.	Within India and Burma.	Transit mails.	*Total.	To India and Burma from the East.	From India and Burma to the West.	Within India and Burma.	Transit mails.	*Total.	
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1933 (July to December).	No record.	No record.	No record.	No record.	7,797	No record.	No record.	No record.	No record.	13,888	21,685
1934	21,020	3,537	994	12,734	38,285	1,395	34,367	1,527	8,874	46,163	84,448
1935	40,278	6,677	2,246	48,623	97,824	5,791	44,555	3,533	41,280	95,159	192,983
1936—											
March quarter	11,720	2,128	1,026	No record.	14,874	3,374	11,664	1,512	No record.	16,550	31,424
June quarter	10,705	2,767	1,008	Do.	14,480	3,657	12,367	1,493	Do.	17,517	31,997
September quarter	11,906	3,368	1,211	Do.	16,485	4,878	14,067	1,814	Do.	20,759	37,244
December quarter	14,774	3,522	1,233	Do.	19,529	5,356	13,981	1,761	Do.	21,108	40,637
Total for 1936	49,105	11,785	4,478	No record.	65,368	17,265	52,879	6,580	No record.	75,934	141,302

* Totals for 1936 do not include transit mails.

APPENDIX 6.

Regularity and Traffic Statistics of Trans-India Air Service—Karachi-Calcutta-Rangoon-Singapore. Imperial Airways, Ltd. and Indian Trans-Continental Airways, Ltd.

Period.	Services.		*Percentage regularity.	Aircraft mileage.	Passenger-ton-miles.	Freight-ton-miles.	Mail-ton-miles.
	Scheduled.	Completed.					
1933 (July to December)	51	50	98	97,748	12,311	1,521	12,869
1934	106	106	100	381,469	78,375	14,159	71,429
1935	208	208	100	580,127	117,180	24,650	209,556
1936—							
March quarter	52	52	100	190,620	33,237	5,940	65,727
June quarter	52	52	100	192,656	33,374	5,774	68,773
September quarter	53	53	100	183,605	31,820	5,497	76,123
December quarter	53	53	100	201,647	41,172	7,916	92,292
Total for 1936	210	210	100	768,528	139,603	25,127	302,915

* Journeys completed of journeys commenced.

APPENDIX 7.
Karachi-Bombay-Madras Air Mail Service.
(Tata Sons, Limited).
Operational Statistics.

Period.	Services.		Aircraft mileage.	Mails.		Passengers.		Freight.	
	Sche- duled.	Com- pleted.		*Per- centage re- gularity.	South- bound. lbs.	North- bound. lbs.	No.	Passenger miles. lbs.	Ton- miles.
1932 (15th Oct. to 31st Dec.)	23	23	35,720	100	1,464	1,510	1	660	53 No record.
1933	104	104	137,280	100	10,346	13,139	8	5,285	293 No record.
1934	105	105	138,600	100	18,071	23,416	14	8,245	111 45
1935	207	204	287,610	98.5	33,548	34,077	40	26,005	364 137
1936—									
March quarter	53	53	78,670	100	9,701	9,252	7	4,040	27 8
June quarter	52	51	72,120	98.1	8,999	9,121	22	11,140	105 33
September quarter	52	52	74,090	100	9,839	9,795	14	5,240	409 151
December quarter	53	52	77,046	98.1	12,126	12,171	26	18,215	442 152
Total for 1936	210	208	301,926	99.1	40,665	49,339	69	38,635	983 344

* Journeys completed of journeys commenced.

APPENDIX 8.
Karachi-Lahore Air Mail Service.
(Indian National Airways, Ltd).
Operational Statistics.

Period.	Services.			Aircraft mileage.		Mails.		Passengers.		Freight.	
	Sche- duled.	Com- pleted.	*Per- centage re- gularity.			North- bound. lbs.	South- bound. lbs.	No.	Passenger miles. lbs.	Weight. lbs.	Ton- miles.
1934 (4th to 31st December)	8	8	100	5,328	1,529	1,015	..	..	..	..	..
1935	208	203	97	147,174	12,693	13,005	2	900	75	22.3	83
1936—											
March quarter	52	52	100	38,929	3,425	3,167	1	432	14	4.5	
June quarter	52	52	100	37,500	3,455	3,389	2	1,432	13.5	4.3	
September quarter	53	53	100	39,084	3,625	3,509	..	..	1	0.3	
December quarter	52	52	100	39,800	4,227	4,668	..	..	..	..	
Total for 1936	209	209	100	155,313	14,732	14,733	3	1,864	29.5	9.1	

* Journeys completed of journeys commenced.

APPENDIX 9.
Bombay-Trivandrum Air Service.
(Tata Sons, Limited).
Operational Statistics.

Period.	Services.		*Percentage regularity.	Aircraft mileage.	Mails.		Passengers.		Freight. lbs.
	Scheduled.	Completed.			South-bound. lbs.	North-bound. lbs.	Number.	Passenger miles.	
1935—									
December quarter . .	19	19	100	14,916	59	21	11	7,332	..
1936—									
January to April . .	32	32	100	24,366	81	48	21	13,368	..
October to December .	19	19	100	14,934	71	14	7	5,502	..
Total for 1936 . .	51	51	100	39,300	152	62	28	18,970	..

* Journeys completed of journeys commenced.

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APPENDIX 10.
Irrawaddy Flotilla and Airways, Limited.
Operational Statistics.

Period.	Services.		*Percentage regularity.	Aircraft mileage.	Passengers.		Freight. Weight. lbs.
	Scheduled.	Completed.			No.	Passenger miles.	
1936—							
March quarter . .	39	29	74.4	17,226	86	19,734	..
June quarter . .	39	24	64.9	13,766	56	10,920	..
September quarter .	40	8	20.0	6,301	15	3,185	..
December quarter . .	48	30	62.5	18,121	92	26,702	20
Total for 1936 . .	166	91	55.5	55,414	249	60,541	20

* Journeys completed of journeys commenced.

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APPENDIX 11.

Scheduled Air Services.—Traffic expressed in ton-miles.

Name of Company.	Route operated.	P. T. M.	M. T. M.	P. T. M.	P. T. M.	C. T. M.	Percent- age of T. T. T. M. to C. T. M. (Load factor).	Increased of Load factor over 1935.	Remarks.
Imperial Airways and Indian Trans-Con- tinental Airways, Ltd.	Karachi-Singapore.	139,603	302,915	25,127	407,645	740,470	Per cent. 63.2	5.8	
Tata Sons, Ltd.	Karachi-Madras	4,194	32,986	344	37,534	76,455	49	..	
Tata Sons, Ltd.	Bombay-Trivandrum.	1,685	59	..	1,744	7,413	24	..	
Indian National Airways, Ltd.	Karachi-Lahore.	221	8,579	9	8,809	30,394	29	4.1	Seasonal, October to April only. This service is mainly organised for the carriage of mails. Passengers are not carried except in special cases.
K. L. M.	Amsterdam-Batavia.	768,953	479,733	148,833	1,397,519	1,717,961	81.3	9.2	
Total		914,656	824,282	174,313	1,913,251	2,572,693	74.4	..	

NOTE.—P. T. M. Passenger-ton-miles.
F. T. M. Freight and excess baggage ton-miles.
M. T. M. Mail-ton-miles.
C. T. M. Capacity-ton-miles.
T. T. T. M. Total Traffic ton-miles.

APPENDIX 12.

Personnel employed and Aircraft owned by aeronautical organisations in India, 31st December 1936.

Name of Organisation.	Administrative.		Pilots.		Engineers licensed.		Engineers unlicensed.		Clerical.		Others.		Total.		Percentage Indian Personnel.	Aircraft.	
	E	I	E	I	E	I	E	I	E	I	E	I	E	I			
Directorate of Civil Aviation	10	39	...	...	...	...	...	...	...	110	...	52	10	201	95.3	Avro X 1 Star of India (Avro 642)	
Imperial Airways and Indian Trans-Continental Airways, Ltd.	16	21	Not known	...	31	30	...	...	...	44	...	70	47	165	77.8	Atalantas 4. D. H. 86	
Indian National Airways, Ltd.	2	14	4	2	4	4	...	4	...	...	1	31	11	55	83.3	Perdval Gull 2. D. H. Fox Moth 2. D. H. Dragon Moth 2. Avro X 1	
Tata Sons, Ltd.	1	13	1	5	1	6	...	3	...	...	...	10	3	43	93.5	Leopard Moth 1. Miles Merlin 2. Fox Moth 2. Waco YQC-6	
Travaddy Flotilla and Airways, Ltd.	1	...	1	...	1	1	...	2	...	2	...	...	3	5	62.5	D. H. Fox Moth Seaplane 1 Short Seon Senior seaplane 1	
Aeronautical Training Centre of India, Ltd.	1	3	3	1	7	5	...	5	1	4	...	6	12	24	66.7	Moth 60 G. Comper Swift Miles Hawk	
Subsidised Flying Clubs	9	6	5	5	3	12	...	...	...	30	...	90	17	143	84.1	D. H. 60 Major Moth 11. D. H. Moth 3. D. H. Tiger Moth 1. D. H. G. Moth 1. D. H. 85 Leopard Moth 2. B. A. Swallow 3. D. H. 83 Fox Moth 1. D. H. 87A 1. Blackburn Bluebird 1. B. A. C. Super Drone 1	
Indian States Flying Organisations and Clubs.	1	2	2	...	3	1	...	...	...	...	7	...	15	6	25	80.6	D. H. Tiger Moth 4
Indian Air Survey and Transport, Ltd.	1	...	1	...	2	...	...	...	...	23	2	43	6	66	91.7	D. H. 85 Leopard Moths 2	

* Includes Aerodrome Officers, Aircraft Inspectors and Examiners.

† Includes wireless operators.

‡ Includes Floodlight operators.

E = Europeans. I = Indians.

APPENDIX 13.

Summary of the work of the Flying Clubs and Training Institutions 1936.

Summary of the Work of the Flying Clubs and Training Institutions.									
	Number of Members.			No. of aircraft.	Hours flown.			Total flying.	Amount of subsidy and bonuses earned.
	Europeans.	Indians.	Total.		Dual.	Solo.	Commercial.		
FLYING CLUBS.									
Subsidised.									
Bengal (Dum Dum)	102	135	237	2	181	360	40	52	13,800
Bombay	213	352	565	5	380	980	85	76	16,300
Delhi	49	149	198	5	471	822	23	34	18,000
Karachi	19	58	77	5	537	964	201	19	17,300
Madras	75	109	184	4	382	407	8	37	16,600
Northern India (Lahore)	8	134	142	3	333	621	31	57	13,400
United Provinces (Cawnpore)	78	123	201	3†	132				12,800
Unsubsidised.									
Burma	30	..	30	1	..	161	..	..	900
Jodhpur	24	25	49	2	207	314	69	95	bonus only
Hyderabad†	10	31	41	2	244	100	14	8	..
Training Institutions.									
The Aeronautical Training Centre of India, Ltd.	..	..	..	3	17	280	38	13	..
Total	608	1,067	1,675	35	2,884	5,989	904	557	1,08,200

* Includes 189 hours, 20 mins, flown during flight to England and back.

† 1 crashed on the 31st October 1936.

‡ Started flying operations in June 1936.

APPENDIX 14.

Summary of expenditure from the Petrol Tax Fund 1931-32 to 1936-37.

[illegible]

IX 13. Summary of the work of the and Training Institutions 1936.

APPENDIX 15. Summary of Accidents in India.

Class of Flying.	1936.				1937.				1938.				1939.			
	No. of Accidents.				No. of Accidents.				No. of Accidents.				No. of Accidents.			
	Unlicensed Pilots.	Licensed Pilots.	Total.	No. of hours flown in year.	Unlicensed Pilots.	Licensed Pilots.	Total.	No. of hours flown in year.	Unlicensed Pilots.	Licensed Pilots.	Total.	No. of hours flown in year.	Unlicensed Pilots.	Licensed Pilots.	Total.	No. of hours flown in year.
INDIAN AIRCRAFT.																
Flying Clubs.																
Bombay	...	4	4	1,520	380	1	3	4	2,147	537	...	2	2	4	1,850	463
Bengal.	...	...	...	633	...	...	1	1	1,064	1,064	1	2	3	2	1,639	416
Delhi	...	1	1	1,350	1,350	...	1	1	816	816	...	...	...	1	1,400	700
Jodhpur	...	2	2	684	342	...	...	...	299	...	...	...	...	...	516	...
Kathlawar	...	...	...	...	...	...	...	...	...	...	...	2	2	1	1,017	1,017
Karachi	1	2	3	2,086	695	3	3	3	2,407	802	...	...	2	2	2,128	1,004
Madras	...	...	...	1,566	...	2	2	2	1,365	608	1	2	3	2	1,348	440
Northern India	3	1	4	785	196	...	...	...	628	...	...	1	1	...	139	...
Rangoon	...	...	...	161	...	1	1	1	744	744	...	...	...	...	...	...
United Provinces	...	2	2	841	420	...	...	...	1,399	...	...	...	2	3	984	321
Hyderabad	...	...	...	360	...	...	...	...	...	...	...	...	...	...	...	...
Total Clubs	4	12	16	9,992	625	1	11	12	10,860	905	2	9	11	19	10,995	679

Regular Air Transport	...	5	5	13,088	2,618	...	4	4	11,280	2,822	...	1	1	...	...	...	1	1	...
Miscellaneous Commercial	...	3	3	2,017	672	...	...	...	5,176	...	2	1	3	...	...	...	...	...	...
Private Flying	...	1	3	...	...	...	3	3	not known.	not known.	1	4	5	...	...	...	2	2	...
Total Indian	5	23	28	25,005	896	1	16	19	27,325	1,438	5	15	20	...	...	5	17	22	...
NON-INDIAN AIRCRAFT.																			
Hire or Reward	...	1	1	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...
Private Flying	...	1	1	...	...	...	2	2	...	...	...	4	4	...	...	...	2	2	...
Total Flying	5	25	30	...	...	1	21	22	...	...	5	19	24	...	...	5	19	24	...
GROUND ACCIDENTS.																			
Indian Aircraft.																			
Karachi Aero Club	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...
Private Flying	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...
Non-Indian Aircraft	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	1	...
Total ground	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	5	...
GRAND TOTAL.	5	25	30	...	...	1	21	22	...	...	5	19	20	...	...	5	19	20	...

APPENDIX 13.

ork of the Flying Clubs and Training Institutions 1936.

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APPENDIX 16.

Analysis of Causes of Accidents to Indian Aircraft.

	1936.	1935.	1934.	1933.		1936.	1935.	1934.	1933.
Personnel	71.8	83.7	85.0	85.7	Error of pilot	71.8	82.4	78.8	85.7
					Supervisory Personnel	...	1.3	6.2	...
					Other Personnel	...	...	5.0	...
Material	8.4	11.1	5.0	2.5	Power plant failure	...	0.0	5.0	2.3
					Structural Failure	...	4.0	...	...
					Handling Qualities	...	0.5	...	...
Miscellaneous	16.2	...	10.0	12.1	Weather	8.2	...	6.0	5.2
					Airport or Terrain	4.4	...	2.5	1.1
					Other	3.6	...	1.5	5.7
Undetermined and doubtful.	3.6	5.2	...	...	Undetermined and doubtful.	3.6	5.2	...	...

- (1) This was due to an airlock in the fuel feed pipe line.
- (2) Caused by an inlet valve not being fully open during.
- (3) Due to insufficient response to throttle control during a down draught.
- (4) Due to aircraft striking a vulture.

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APPENDIX 17.

Fatality and Accident Rates in Respect of Major Accidents to Indian Aircraft.

	1936.	1935.	1934.	1933.
(1) Aircraft hours flown	25,095	27,325	18,413	15,240
(2) Aircraft miles flown (Approx.)	2,318,000	2,378,000	1,625,000	1,200,000
(3) Accidents involving fatalities—				
(a) Crew	2	5	3	...
(b) Passengers	...	4	...	...
(c) Other Persons	...	1	1	...
(4) Non-fatal accidents involving serious injuries—				
(d) Crew	1	...	2	3
(b) Passengers	2	...	...	...
(c) Other Persons	1	...	...	...
(5) Number killed—				
(a) Crew	2	6	3	...
(b) Passengers	...	6	...	...
(c) Other Persons	...	2	1	...
(6) Number seriously injured				
(a) Crew	1	2	4	3
(b) Passengers	2	...	...	...
(c) Other Persons	2	...	...	...
(7) Miles flown per fatality	1,159,000	170,000	408,000	...
(8) Miles flown per serious injury or fatality.	331,000	149,000	203,000	400,000



R
X43.2 N3
N37