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REPORT ON COMMERCIAL AIR TRANSPORTATION ACTIVITIES IN ENGLAND, FRANCE, GERMANY AND HOLLAND.

Prepared for U. S. Army Air Service,
by Lieut, J. Parker Van Zandt.

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REPORT ON COMMERCIAL AIR TRANSPORTATION ACTIVITIES IN ENGLAND, FRANCE, GERMANY AND HOLLAND.*

By Lieut. J. Parker Van Zandt, Air Service, U.S.A.

Introduction

The following pages present a review of the air transportation activities of England, France, Germany and Holland, based on an inspection trip during the summer of 1924. The material for each country is discussed under the following titles:

Operating Companies
Nature of Transportation Services
Air Traffic
Flying Equipment
Government Relations
General

This report is limited to the more important aspects of commercial air operations abroad.

The accompanying map indicates the routes in operation in 1924.

Summary of Conclusions

The development of commercial air transportation abroad has been controlled or influenced by so many factors, both obvi-

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ous and obscure, that a bald summary of the present status may prove somewhat misleading, particularly if the conclusions are applied without careful interpretation to another region, such as the United States. The operating experience of European air lines, covering a period of over five years, constitutes information of great value in the study of air transportation; but conditions in Europe have been so abnormal in the years since the war and the temper and characteristics of the European peoples have affected the results so importantly that it is necessary to proceed with care in applying the data elsewhere.

With this in mind, the situation may be summarized from both a negative and positive point of view, as follows:

Negative

1. No air transportation company is self-supporting.

Commercial receipts vary from about 5 per cent of the total expenses, for one French company, to approximately 40 per cent, for the Royal Dutch Air Service.

2. Business men using air lines regularly for commercial purposes are still a small proportion of the total passenger traffic.

Two notable exceptions are: between Danzig and Königsberg (93 miles) where Germans travelling by air avoid the necessity of passing through Polish Customs; and between

Toulouse, France, and Morocco (1160 miles) where more than a day's time is saved.

3. The regularity of service, particularly of departure and arrival on scheduled time, is not yet on a par with railroad standards. This, coupled with the generally short length of routes flown and the suspension of service in many instances during the winter months, is a serious handicap to the development of a permanent air traffic.

An exception is the Latecoere line to Morocco, where satisfactory regularity is maintained throughout the twelve months of the year; and the relatively large saving in time makes small delays of less importance.

4. Air mail traffic has not developed as anticipated. As explained in part by (3) above, the Latecoere line is again an exception. The lack of night flying, the frequent relatively long interruptions to service during the winter months due to unfavorable weather, and the complicated relations between the many nations generally involved, are the principal difficulties.

5. The rates charged in general are not in economic relation to the actual operating expenses.

It follows that the resulting volume of traffic, in so far as it is controlled by the relative cost of the service, is not a true measure of the real merits of air transportation. Passenger rates as a general rule are not much

more than first-class travel by railroad. Contracts for goods traffic on routes such as Paris-London where competition is keen, are often placed at rates far below the actual expense of transportation. The difference is covered by Government subsidy grants; and the policy is justified as a means of educating the public to the use of air transportation.

6. The development of air transportation in Europe on a rational business basis is seriously handicapped by political and economic complications.

The principal traffic lanes in Europe in almost every instance involve flight into or over one or several foreign countries; each country, however, is intent upon developing its own national air transportation resources and regards with disfavor or distrust the operations of foreign competitors within its boundaries. The inherent advantage of air transportation is best realized by the operation of relatively long routes between peoples of common economic interests, for which the present political and economic conditions in Europe are fundamentally unfavorable.

7. Night flying is not as far advanced in Europe as in the United States Air Mail Service.

Night flying requires a thorough ground organization and political difficulties again complicate the problem,

as the terrain of different countries is generally involved. The emphasis which has been placed on passenger traffic rather than mail and goods is unfavorable to the development of night routes. Subsidy relations in the past in many instances have operated to discourage efforts in this direction.

8. Airways and navigation facilities in general are not as thoroughly organized as a satisfactory reliability of service requires. Progress is to be noted, however, in the organization of the meteorological service in England and France; and the use of radio telephony in England. Political difficulties and subsidy relations, as explained in (7), above, are the principal handicaps. They are just beginning to realize in Europe that to build up a permanent business, the interests of traffic must be given first consideration.

9. Passengers are a more difficult form of traffic, from an operating point of view, than mail or goods.

Mail and goods are not subject to airsickness; and questions of taste, fancy, or comfort do not enter. Mail, especially, will bear a higher charge per pound or per cubic foot than will the average passenger. Mail and goods traffic is relatively constant throughout the year, whereas passengers are much more difficult to attract during the winter. Mail and goods are easier to handle in case of forced landing en route; they are less likely to be damaged

in case of disaster and the psychological effect of a crash is less. Schedules may be arranged at hours which would be inconvenient for passengers and the distance from the cities to the terminal fields is less of a handicap. The presence, however, of a large number of tourists in Europe during the summer season, the limits in regularity and the political complications as explained in preceding paragraphs, have operated to emphasize passenger traffic at the expense of mail and goods.

10. No really satisfactory commercial transport airplane has yet been developed.

The majority of airplanes have too slow a cruising speed to be able to maintain their advertised schedules against even moderate head winds; passenger comfort in general leaves much to be desired; airplanes with a high pay load per horsepower generally have a poor rate of climb. Multi-engine airplanes undergoing trial appear to be actually less reliable in service than single-engine airplanes, as well as less economical to operate and less efficient as load carriers. The problem of developing a truly suitable commercial airplane is just beginning to be really seriously attacked.

11. Published figures on the operating costs of European companies are in general of uncertain value.

European costs require careful interpretation with re-

gard to the varying exchange rates, economic conditions, salary and wage scales, standards of workmanship, cost of materials and supplies, effect of subsidies, Government relations, and so forth. Many of the companies at one time or another have invested heavily in unprofitable undertakings, more or less extraneous to their main operation.

12. Unusual or temporary conditions in several instances have operated both as an advantage and a disadvantage to air transportation and tend to obscure its real merits.

The heavy goods air traffic between London and Cologne, for example, has arisen largely through the French occupation of the Ruhr, which has practically shut off all outside markets to German merchants in Cologne, except as they may be reached by air. On the London-Paris line one of the chief attractions for the air shipment of merchandise is the saving of time in Customs clearance, rather than time saved en route; goods are cleared the day of the arrival by a special Customs arrangement, whereas a fortnight's delay is not infrequently incurred through the usual port Customs. On the other side may be noted the attitude of the Spanish Government to the Latecoere line; neither mail nor goods are permitted to be brought into or taken out of Spain by air, the Spanish Government either not wishing to encourage the French line or fearing difficulties with contraband goods.

13. In general, a policy of direct subsidy grants has not resulted in placing air transportation on a rational business basis.

If the subsidy is hedged about with a multiplicity of restrictions the normal development of air transportation may be seriously interfered with; if granted too freely, it may be employed in a manner quite opposed to the permanent good of the industry. France, which has supported commercial aeronautics more liberally than other European countries, has suffered severely on this score and in spite of several changes in the basis of subsidy grants has failed to find a solution. The same is true, to somewhat lesser degree, in other European countries.

It is not intended to place undue emphasis on the negative results of European air transportation experience; they have arisen in large part, as noted above, from the abnormal conditions in Europe since the War. In view, however, of the statements of many Americans returning from abroad, who have reported uncritically on air activities which have come to their attention, a presentation of the facts from a negative point of view may be of service.

Viewed from a positive standpoint there are a number of results, of equal significance, which deserve consideration.

Positive

14. The operation of air transportation services shows everywhere an encouraging increase in regularity and safety, a growth in traffic, and a decrease in unit operating costs.

It is increasingly evident that the limits in regularity, safety, traffic volume, and decreased costs have nowhere been reached and the curve of improvement is steeply upward.

15. Goods of all kinds often may be transported by air with greater safety than by the usual channels of boat or rail.

The insurance rates, for example, covering all risks on shipments such as dresses, furs, jewelry, fragile goods, light machinery, etc., between London and the Continent, are several times less by air than by boat or rail.

16. Freedom from breakage and theft are important factors influencing the growth of air goods traffic, aside from a saving in time.

Fragile goods, vases, and antiques travel by air in order to be assured of careful handling and freedom from damage; while losses from theft, which are excessive on the usual transportation services of the Continent have been found to be practically negligible by air.

17. Air transportation, when suitably established and reliably operated, may attract an important proportion of the exist-

ing traffic of mail and goods.

In several instances large contracts for regular consignments of goods have had to be refused by European air lines, because subsidy relations and other handicaps have made it impractical to handle them. Much mail and goods destined for Morocco which originates in a number of European countries, and as far as North America, is routed via the Latecoere air line in spite of the increased cost, indicating that traffic will seek out and utilize an air service that offers incontestable business advantages.

18. The flying life of an airplane, when properly maintained, has been found to be much longer than originally estimated; and appears to be limited more by obsolescence and inadequacy than by actual depreciation.

The original French estimate was 200-300 flying hours; whereas a number of English, German and Dutch airplanes have been in operation over 1500 hours and are still in excellent condition.

19. The proportion of necessary reserves to actual operating expenses is encouragingly low.

Payments for third-party liabilities have been practically negligible in five years of operation; and insurance rates against all forms of operating hazards are steadily decreasing.

20. Conservative leaders in industry, banking and shipping are taking an increasing financial interest in air transportation.

In England, France, Holland and Germany many of the largest industrial and commercial organizations are actively encouraging the development of national air services, not only from a patriotic point of view, but also from a conviction of its potential importance as a transportation agent. Several cities have made large investments in municipal airports.

21. European experience presents evidence that it is possible for air transportation under suitable conditions to be conducted with a degree of regularity, safety and dispatch sufficient to establish it as an important channel of commerce in the transportation resources of a nation.

There is evidence that the abandonment of several of the air lines would prove a serious handicap to business interests, which have come to rely upon them.

22. By contrast with Europe, the United States offers many advantages for the development of air transportation.

The United States is perhaps better suited to the rational development of air transportation than any country in the world by reason of its geographical extent, freedom from custom restrictions, common national interests, homogeneous business methods, standards of living and intensive commercial activity.

E N G L A N D

Operating Companies.

A union of British air lines, known as "Imperial Airways Ltd." was created on April 1, 1924, in conformity with the recommendations of a Civil Air Transport Subsidies Committee appointed by the Government in the winter of 1923. The agreement was between the Air Minister and the British Foreign and Colonial Corporation Ltd., who undertook to form the air company and to guarantee the subscription of 500,000 of the total of 1,000,000 one-pound shares. (At a nominal exchange of 4.50 this is $2,250,000 of a total capital of $4,500,000.) The Government undertakes to grant an annual subsidy for ten years amounting, in the aggregate, to 1,000,000 pounds. Among the articles of the operating company are:

(a) That the objects for which the company is formed are, among other things, to acquire the business at present carried on by Handley Page Transport, Ltd., the Instone Air Line Ltd., Daimler Hire Ltd., and the British Marine Air Navigation Company Ltd. as aerial transport companies, or in default of such acquisition to establish an air transport service to operate equivalent services.

(b) That the consideration in cash for the purchase (which shall not exceed one-third part of the whole consideration) shall be provided together with the initial working capital of the operating company by means of 10s. per share

payable on application and allotment of the first 500,000 shares issued by the operating company, and that the remaining two-third parts of such consideration shall be satisfied by the allotment to the issuing house or its nominees of fully paid up shares of the capital of the operating company.

(c) That all the directors and shareholders of the operating company shall at all times be British subjects.

(d) That during the period in which the subsidy will be payable the president shall be entitled to nominate on behalf of his Majesty's Government two of the directors of the operating company, who shall join the board thereof after allotment, and shall not be required to hold any qualification shares.

From April 1, 1924, until the subsidy has been repaid, the company undertakes to maintain an efficient air service for the transport of passengers, mails, and freight between London and Paris, London and Brussels, London and Amsterdam, Southampton and the Channel Isles, and other approved places. During the first four years the company will be required to complete in each year a minimum mileage of 800,000 miles, and an average minimum yearly mileage of 1,000,000 and during the remaining years a minimum yearly mileage of 1,000,000.

The subsidy will be payable as follows, subject to reduction in the event of failure to complete the prescribed minimum mileage:

First four years	137,000	pounds	sterling
Fifth year	112,000	"	"
Sixth "	100,000	"	"
Seventh "	86,000	"	"
Eighth "	70,000	"	"
Ninth "	52,000	"	"
Tenth "	32,000	"	"

From the profits of the company 10 per cent on the paid-up capital is to be distributed annually among the shareholders, and the balance, if any, is to be applied as follows: One-third in repayment of the subsidies, one-third for the development and the improvement of the service, and one-third for distribution among the shareholders.

Experimental work at net cost is to be carried out by the company for the Government, and without the consent of the Air Council the company are not to undertake the manufacture of aircraft or aero-engines, or hold shares in any company so engaged. Except with such consent all construction necessary for the air service and so far as possible all accessories used in connection therewith, and all important repairs are to be done, made, or carried out on British territory (emergency repairs only being carried out on foreign territory) and all aircraft engines and accessories used by the company for the Air Service are to be of British design and manufacture.

Only pilots enrolled in the Air Force Reserve or the Auxil-

iary Air Force must be employed by the company, and the members of the technical and administrative ground personnel must be British subjects. Seventy-five per cent of such personnel are to be enrolled in the Air Force Reserve or the Auxiliary Air Force. All the aircraft airdromes and aircraft bases belonging to or controlled by the company are to be at the disposal of the Government in any national emergency.

Provision is made for the adequate equipment of the airplanes engaged to ensure safe and proper navigation, and for the continuance of the facilities already provided at Government airdromes.

Nature of Services.

The summer schedule and rates of the Imperial Airways Ltd. are published in attractive colored pamphlets. Services are subject to considerable change in the different seasons of the year. The six summer months are the most active, due to the presence of a large number of tourists, the favorable flying weather and long hours of daylight.

The daily service to Berlin is operated jointly with the Deutscher Aero Lloyd, the companies flying the route in opposite directions. A tri-weekly service to Zurich and Basle has been operated this summer, catering to the tourist traffic, but probably will be discontinued during the winter months.

Passengers are allowed 30 lb. of free hand luggage. The single fare between London and Paris is 6.6 pounds ($28.30), or

approximately $0.12 per passenger air-mile; this includes free automobile transportation between the terminal fields and the cities. The first-class railroad rate from Paris via Boulogne to London, in June, 1924, was 421.40 francs, or at the then rate of exchange, about $23.00. The great majority of the travelling public, however, go second-class, for which the rate was 296.45 francs (about $16.00). Second-class railroad tickets valid for seven days were less than $9.00. Hence to the rank and file of travellers air transportation on this route involves a serious increase in expense. American and other tourists represent a large proportion of the passenger air traffic.

Ordinary merchandise rates between London and Paris (domicile to domicile) were about $0.08 per lb. for shipments weighing between 50 and 100 lb., but contracts were not infrequently let for $0.03 or less per lb.

The fluctuating rates of exchange involve frequent changes in the rates. During June and July, 1924, a ticket purchased in Paris for London, in francs, was several dollars cheaper than one purchased in London for Paris, in pounds. In general the French rates on this route are less than the English.

Air Traffic.

The accompanying table summarizes the air traffic carried on the cross channel air lines each year up to 1924. By the end of last year 45,531 passengers had been carried to or from the

Continent by air. Out of this total 33,362 passengers (73% of the total) travelled in British aircraft.

The increase in traffic which took place in 1923 more than maintained the rate of increase noted in the previous year. A total of 15,136 passengers and over 800 tons of goods were carried as compared with 12,359 passengers and 477 tons of goods in 1922. The proportion of passengers carried in British airplanes was 79% in 1923 against 77% in 1922.

An indication of the increasing use made of the British cross-channel air lines is given by the average load carried on each flight. In 1922, the average load was about 810 lb. (three or four passengers and about 150 lb. of goods). In 1923, the figure increased to 1200 lb. (four or five passengers and about 270 lb. of goods), an increase of 50%.

The value of merchandise imported and exported by aircraft (British and foreign combined) reached at the end of 1923, a total of 3,180,319 pounds. The total for 1923 alone exceeded three-quarters of a million pounds sterling.

The mileage flown in 1923 by British aircraft engaged in air transport was 943,000 miles (equal to about 38 circuits of the world), an increase of 226,000 miles over the corresponding figure for 1922.

The reliability of the British air lines in 1923 was maintained at about the same level as in 1922 in spite of the fact that new routes were opened and longer flights were made. Where-

as in 1922, on the London-Paris route, which has been in operation since 1919, the flights completed within the time limit fixed under the subsidy scheme, four hours amounted to 92.5% of the total commenced, the corresponding figure for all routes in 1923 reached 91%. (These figures do not include the number of trips scheduled but not commenced, due to bad weather or other causes.)

Cross Channel Air Transport - British and Foreign.

(Arrivals and Departures.)

		1919 Aug. Dec.	1920	1921	1922	1923	Total
Between Gt. Britain and France.							
Airplane flights	(British	364	2073	957	2066	933	6393
	(Foreign	64	657	1565	1463	1069	4818
Passengers carried	(British aircraft	689	5178	5228	7612	7179	25886
	(Foreign aircraft	52	486	4352	2306	2198	9394
Cargo carried (tons)	(British aircraft	--	--	--	139.2	87.8	227.0
	(Foreign aircraft	--	--	--	235.4	398.3	633.7
Between Gt. Britain and Holland (and Germany via Holland from May, 1923).							
Airplane flights	(British	26	496	2	102	638	1264
	(Foreign	--	5	366	580	556	1507
Passengers carried	(British aircraft	25	364	2	213	1736	2340
	(Foreign)aircraft	--	--	480	562	976	2018

Cross Channel Air Transport - British and Foreign (Cont.)
(Arrivals and Departures.)

		1919 Aug. Dec.	1920	1921	1922	1923	Total
Between Gt. Britain and Holland (and Germany via Holland from May, 1923.							
Cargo carried (tons)	(British aircraft	--	--	--	2.2	20.2	22.2
	(Foreign aircraft	--	--	--	59.4	66.8	126.2
Between Gt. Britain and Belgium (and Cologne via Belgium from October, 1922).							
Airplane flights	(British	68	267	52	717	985	2089
	(Foreign	--	104	421	2	391	918
Passengers carried	(British aircraft	129	253	26	1665	3022	5095
	(Foreign aircraft	--	98	630	1	12	741
Cargo carried (tons)	(British aircraft	--	--	--	41.4.	220.3	261.7
	(Foreign aircraft	--	--	--	--	33.8	33.8
Total: All cross-channel routes.							
Airplane flights	(British	467	2854	993	2891	2559	9764
	(Foreign	64	768	2404	2048	2016	7300
	(Total	531	3622	3397	4939	4575	17064
Passengers carried	(British aircraft	870	5799	5256	9490	11947	33362
	(Foreign aircraft	52	584	5475	2869	3189	12169
	(Total	922	6383	10731	12359	15136	45531
*Cargo carried (tons)	(British aircraft	--	--	--	182.8.	328.1	510.9
	(Foreign aircraft	--	--	--	294.8	498.9	793.7
	(Total	--	--	--	477.6	827.0	1304.6
Value of goods imported & exported: All cross-channel routes		£ 90936	£ 1028812	£ 571300	£ 713020	£ 776251	£ 3180319

*The figures for cargo carried refer to 1922 and 1923 only.

The following records are taken from the books of the Customs Office at Croydon and indicate the volume of outgoing traffic from this field during the past five years. The number of trips abandoned and packages and passengers returned through customs is also given; for 1923 it is stated that 23 trips were abandoned, affecting 65 passengers.

Abstract for 1919 - July-December inclusive.

Nationality of airplanes departing.	No. of air-planes	No. of pack-ages exported	Passen-gers depart-ing	Voyages abandoned and returned. Airplanes	Goods No. of par-cels	Passengers No. of
British	270	2032	521	7	61	14
French	32	157	22	2	-	1
Belgian	2	-	2	-	-	-
	304	2189	545	9	61	15
Deduct	9	61	15			
Total	295	2128	530			

Abstract for 1920 - January-December inclusive.

British	1005	8380	1652	29	216	44
French	319	791	177	2		
Belgian	15	29	9			
Others	2		2			
	1341	9200	1840	31	216	44
Deduct	31	216	44			
Total	1310	8984	1796			

Abstract for 1921 - January-December inclusive.

Nationality of airplanes departing	No. of airplanes Total	With cargo only	No. of packages exported	Passengers departing	Air planes Total	Goods No. of parcels	Passengers	No. of airplanes with cargo
British	545	299	1987	2414	4	18	13	3
French	787	460	3236	2024	10	57	28	5
Belgian	212	137	570	272	1	2	1	4
Dutch	185	177	3139	195	3	54	-	-
	1729	1073	8932	4905	18	131	42	12
Deduct	18	12	131	42				
Total	1711	1061	8801	4863				

Abstract for 1922 - January-December inclusive.

British	1449	757	7969	4434	26	73	59	8
French	736	628	7525	1057	16	127	27	12
Dutch	292	283	5076	237	3	49	3	2
Belgian	2	-	--	1	-	-	-	-
	2479	1668	20570	5729	45	249	89	22
Deduct	45	22	249	89				
Total	2434	1646	20321	5640				

The decrease in the number of airplanes in 1923 is due to employing larger airplanes: Goliaths in place of Spads, and Breguets and 34's in place of DH 16's.

1923 by Months.

(1') No. of airplanes with cargo (goods).
(1) No. of airplanes departing during month.
(2) No. of passengers departing during month.

	British			French			Dutch		
	(1)	(1')	(2)	(1)	(1')	(2)	(1)	(1')	(2)
January	47	24	169	15	15	22	17	16	17
February	41	14	135	13	12	23	11	11	11
March	75	36	328	33	22	109	24	22	25
April	90	61	442	45	24	68	26	25	27
May	159	95	632	30	27	50	26	26	20
June	160	93	699	48	47	52	28	26	38
July	166	101	1055	56	52	118	28	26	60
August	195	104	1058	68	57	139	35	32	63
September	155	95	588	49	44	94	36	27	40
October	105	81	259	25	22	44	20	20	27
November	73	64	133	17	17	29	12	11	14
December	53	40	93	11	10	16	12	12	9
Total	1319	808	5581	410	349	764	275	254	351

These records were compiled by Customs officers at Croydon, unofficially for their own information. The year 1923 was the best for the old companies: Handley Page, Instone and Daimler Hire; the K.L.M. had heavy radio shipments. Handley Page ran his best summer with passengers, sending the goods off by rail; and Instone had a great artificial goods trade with Cologne. The records of the number of packages were not kept for 1923. This is unfortunate, as goods customs payments were three times the preceding year. The French secured the largest portion of this between London and Paris.

Flying Equipment.

The Imperial Airways has relatively only a small fleet of airplanes: 3 Handley Page W8's equipped with 2 Rolls-Royce 360 HP. engines each; 6 D.H. 34's with Napier Lion 450 HP. engines; 2 D.H. 50's with Siddeley Puma 240 HP. engines. Other equipment taken over when the previous companies were amalgamated, and now apparently obsolete, are: 2 Handley Page O-400's; 2 Bristol Jupiters; and a Vickers Vulcan with Jupiter 400 HP. engine. The total number of airplanes on hand is of course subject to change as crashes occur or additional equipment is acquired.

New airplanes are on order, at the expense of the Air Ministry, it is understood, which are to be loaned to the company to be tried out in commercial service. The De Havilland Company has an airplane in construction similar in type to the D.H.34 but equipped with a 600 HP. Condor engine and intended to carry 14 passengers (The Condor is said to develop 650 to 680 HP.). The airplane is scheduled to be completed in January, 1925. Handley Page has built several three-engine airplanes, which are a modification of the W8B with a Rolls-Royce "Eagle" in the nose of the fuselage and two Siddeley Pumas in separate nacelles on each side. The Belgian company is using this airplane between Rotterdam, Brussels and Basle, Switzerland, and the English company is to receive one when the Air Ministry has completed its tests. The airplane is not efficient as a commercial load carrier and is not believed to represent any permanent advance. The Avro Company

has built an ambulance airplane around the Condor engine, which may be modified later for use in commercial service.

Government Relations.

Commercial aeronautics is probably more thoroughly regulated in England than in any other country in Europe. An Air Navigation Act of December, 1923, prescribes the character of inspection, airworthiness certificates, and other control to be exercised. Undoubtedly this close supervision has much to do with the excellent safety record of the English subsidized air lines. The London airdrome at Croydon is the only important commercial field in England. It is operated by Air Ministry representatives, and the entire cost is borne by the government. About 65 men are employed, of whom 9 are assigned to radio and 8 to meteorology, and the pay roll is about $45,000 per year. The government has purchased the adjoining 100 acres and has plans under way for completely rebuilding the airdrome. Some income is received for hangar and office rentals, landing fees and so forth; the Commandant, Captain Baker, estimates, however, that there is an annual net dead loss of about $75,000.

A small force for radio and meteorology is maintained at Lympne on the Channel and, together with a radio D.F. station at Poulham, some 60 miles north, checks each airplane by radio as it crosses the Channel to or from the Continent.

There are a number of ways in which the air transport companies receive indirect aid from the government. The estimates for

civil aviation for 1924-1925 provide a net sum of $1,600,000, of which the direct subsidy payments to the Imperial Airways Ltd. represent only $616,000. $162,000 is allotted for the staff and upkeep of civil airdromes; $153,000 for aerial routes, surveys, etc.; $45,000 for technical equipment; $665,000 for works, buildings and lands, of which the greater portion is in connection with improvements and extensions contemplated at the Croydon airdrome. The relations between the government and civil aeronautics, as of March, 1924, are excellently set forth in detail in the last annual report of the Director of Civil Aviation (see "Annual Report on the Progress of Civil Aviation," April 1, 1923,-March 31, 1924).

General.

The only other commercial company of importance is the De Havilland Hire, which rents airplanes and pilots to individuals for trips of any kind at a rate of 2 shillings ($0.45) per mile. One American business man for three successive years has made use of this service, last summer flying some 12,000 miles through Egypt, North Africa, Italy and elsewhere. An important source of income to this company is a contract with the government to operate a refresher school for reserve pilots. Last year a total of about 240,000 miles was flown, of which over 25 per cent was in connection with the school. Considerable flying is also carried on for newspapers and aerial photography. The experience thus acquired is incorporated in the design of new airplanes.

England is very much handicapped in the development of air lines as almost every extension involves flight into or over one or several foreign countries. Each country is intent upon developing its own national air services and regards with disfavor or distrust the operation of foreign competitors within its boundaries. The general economic restoration and peace of Europe appears necessary before air transportation can be expected to develop along normal business lines. In the meantime the unsettled conditions result occasionally in temporary advantage, as in the case of the London-Cologne service for which a purely artificial traffic was created because of the French occupation of the Ruhr.

English equipment is limited to the "stick-and-wire" type of airplanes, with which they have had surprising success. Welding is still prohibited in airplane construction. Their greatest operating problem is to maintain satisfactory regularity during the winter months when heavy ground fogs are common. The lack of winter regularity prevents mail traffic from developing and is a serious handicap in obtaining annual contracts for the carriage of goods. The heavy passenger traffic is largely restricted to the summer tourist season. Their most valuable traffic asset at present is the prevalent idea among Americans going abroad that a flight between London and Paris should be included in any well regulated tour. (See also "Preliminary Report on British Commercial Aeronautics," July 8, 1924.)

Airplanes at Croydon, ready for sceduled departure

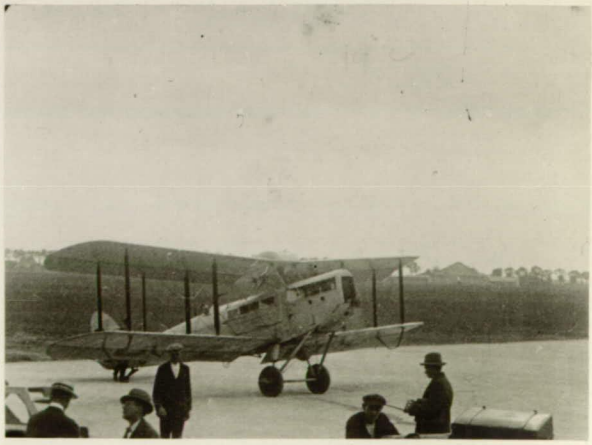
Guards in courtyard before passenger waiting room at Croydon Aerodrome.

Passengers and goods arriving at Croydon Aerodrome

French, English and Dutch planes at Croydon Aerodrome.

Control tower, from which all flying is directed.

Croydon Aerodrome.



D.H.50 with Siddely Puma 340 HP. engine, on cement mat at Paris Aerodrome; and being serviced at hanger rented from French Gov't by British air line.

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F R A N C E

Operating Companies.

There are four subsidized air transportation companies in France: The Air Union is the result of an amalgamation in 1923 of the former Messageries Aeriennes and the Grands Express Aeriens. It covers the route between Paris and London and by contract with the Farman Company, between Paris, Brussels, and Amsterdam. The Compagnie Generale d'Enterprises Aeronautiques (Lignes Aeriennes Latecoere) exploits the routes between Toulouse and Casablanca, Morocco; Casablanca and Oran, Algeria; Oran and Alicante, Spain; and between Marseilles and Perpignan, France. The Compagnie Franco-Roumaine de Navigation Aerienne operates between Paris, Strasbourg, Prague, Vienna, Budapest, Belgrade and Bucharest; between Prague and Warsaw; and, when the Turkish Government permits, between Bucharest and Constantinople, with a tentative extension to Angora. The fourth company, L'Aeronavale, at present relatively unimportant, operates a seaplane service between Antibes and Ajaccio, in the Mediterranean.

Nature of Services.

The schedules and rates of the above companies are published in pamphlets. Latecoere and Air Union operate throughout the year, Franco-Roumaine from February 15, to November 15. All three companies carry passengers, mail and goods. The mail load is neg-

ligible except on the Latecoere line where it constitutes the major portion of the traffic (See Preliminary Report on Latecoere Air Lines, August 5, 1924, ref. E 10 E/313). Air Union operates in competition with the English air line on the London-Paris route; and with the Dutch K.L.M. Company on the Paris-Brussels-Amsterdam route. Between Vienna and Budapest the Franco-Roumaine service encounters competition with the German Trans-Europa Union and with a local Hungarian passenger service.

Air Traffic

The number of kilometers flown, passengers carried, kilograms of merchandise and mail transported, and so forth, by months for the years 1919 to 1923 inclusive, for all French air lines are shown in the following tables.

Total Traffic for all French Air Transportation Lines.

	1919	1920	1921	1922	1923
No. of flights	1011	2565	6558	7581	9951
Miles flown	166000	533000	1470000	1750000	2120000
Passengers carried	588	1711	10619	9502	11638
Goods carried (lb.)	18600	169600	576000	1224000	2133000
Mail carried (lb.)	2060	34500	76800	369000	712000
Total mail and goods (tons)	10.33	102.05	326.4	796.5	1422.5

To indicate the relative importance of the different companies as regards the distance flown and the character of traffic, the statistics for 1923 are retabulated as follows:

Total Traffic of all French Lines in 1923.

(On lines involving several stops the load is counted for each separate journey.)

Companies	Lines	Trips attempted		Kilometers flown
		Complete	Incomplete	
Air Union	Paris-London	1018	57	384228
	Paris-Brussels	535	13	150529
Compagnie Generale d'Enterprises Aeronautiques (Latecoere)	Toulouse-Casablanca	3895	40	1342495
	Casablanca-Oran	621	3	156995
	Marseille-Barcelona	415	2	107557
Compagnie Franco-Roumaine	Paris-Bucharest	2646	69	1009731
	Prague-Varsovie	254	18	139645
Aeronavale	Antibes-Ajaccio	214	8	52592
Reseau Aerien Trans-Africain	Algiers-Biskra	80	17	31356
	Biskra-Touggourt	32	1	6354
	Touggourt-Ouargla	6		990
Compagnie Atlantique	Dakar-Kayes	4	3	4813
Totals		9720	231	3387195

Total Traffic of all French Lines in 1923 (Cont.)

(On lines involving several stops the load is counted for each separate journey.)

Companies	Lines	Passengers not including baggage Passenger Stages	Merchandise in kg Stages	Mail in kg Stages
Air Union	Paris-London	2303	436927	769
	Paris-Brussels	1409	69611	649
Compagnie Generale d'Enterprises Aeronautiques (Latecoere)	Toulouse-Casablanca	3585	211807	302488
	Casablanca-Oran	591	20203	14349
	Marseille-Barcelona	81	5299	2729
Compagnie Franco-Roumaine	Paris-Bucharest	2766	210500	6606
	Prague-Varsovie	214	14030	849
Aeronavale	Antibes-Ajaccio	242	508	
Reseau Aerien Trans-Africain	Algiers-Biskra	96	112	1
	Biskra-Touggourt	41	4	
	Touggourt-Ouargla	10		
Compagnie Atlantique	Dakar-Kayes			
Totals		11338	969001	328440

The passenger traffic of the Air Union between London and Paris is similar to that of the Imperial Airways, namely, tourists for the most part, during the summer season. A special effort has been made to attract a goods traffic, for which the line is favorably situated as Paris is the greatest exporting center in Europe for merchandise of high intrinsic value. French manufacturers favor the French companies, and also the falling exchange value of the franc has made the French lines less expensive. There are heavy shipments of perfumery, motor car parts, motion picture films, silks, dresses, ladies' shoes, lingerie, hats, wireless material, hosiery, capes, fresh berries, laces, optical goods, jewelry, woven goods, and a hundred other types of articles.

The Franco-Roumaine carries a similar assortment of merchandise, the predominant character of the traffic depending upon the national interests of the countries served. There are heavy shipments of silk material from Lyons, France, by train to Strasbourg, and thence by air to Warsaw. Vienna exports much fashion goods, as neckties and knitted articles; Prague, glassware. East of Vienna, however, the traffic is very light. The heavier traffic is outbound from Paris and it is found difficult to build up a satisfactory return load. The Franco-Roumaine claim they have several times more traffic offered than they can carry on certain portions of their route; but being closely restricted by subsidy agreements they cannot alter their service to properly conform to varying business conditions. Passengers on this

line are largely restricted to the tourest season, but there are a fair number of Czechs, Roumanians, French and other nationals who travel rather frequently.

The failure of mail traffic to develop is due to a number of causes: on all lines (except Latecoere) the service is too irregular during the months of bad weather; it is difficult to get the several countries involved to work together to promote air mail; and the density of mail exchange, especially on the Balkan line is low, many times less than on the principal traffic lanes in the United States. The success of the Latecoere line to Morocco, however, indicates that mail will seek out a service that offers a real saving in time and maintains a satisfactory regularity throughout the year. (The best source of data on French traffic is the "Ephemerides de l'Aeronautique," published monthly by the "Comite Francais de propagande aeronautique," 29 rue de la Bienfaisance, Paris 8.)

Flying Equipment.

The types of airplanes employed are listed below:

	Aircraft	Engines
Air Union	Breguet 14 T	400 HP. Lorraine D
	Breguet 14 T bis	300 HP. Renault
	Spad 27	300 HP. Hispano-Suiza
	Spad 33	260 HP. Salmson
	Goliath	Two 260 HP. Salmson CM8
	Spad 50	300 HP. Hispano-Suiza

	Aircraft	Engines
Cie. Franco-Roumaine	Potez 9 Spad 33 Spad 46 Salmson Caudron 61	370 HP. Lorraine 260 HP. Salmson 375 HP. Lorraine 260 HP. Salmson Three 180 HP. Hispano-Suiza
Cie. Generale d'Enterprises Aeronautiques (Latecoere)	Breguet Salmson F. 70 Liore et Olivier #13	300 HP. Renault 260 HP. Salmson 300 HP. Renault Two 180 HP. Hispano-Suisa
Aeronavale	Donnet Liore et Olivier	Two 180 HP. Hispano-Suiza

The Air Union on January 1, 1924, possessed 14 Goliaths, 10 Breguets and 10 Spads; Franco-Roumaine 49 Spads, 15 Potez, 3 Caudrons and 6 Salmsons, a total of 73; Aeronavale, 5 Liore et Oliviers and 2 Donnets. The Standard Air Union airplane is the Farman Goliath equipped with Salmson engines. The old Salmson CM8 engine has a poor record and is being replaced by Salmson CM9's in which the crankshaft has been strengthened and a number of minor modifications incorporated. The Goliath has a large comfortable cabin and carries about 2200 lb. full load, but its cruising speed of little more than 70 miles per hour is altogether too slow. It is a modification of a night bombardment airplane under construction at the close of the war. A Bleriot equipped with four 180 HP. Hispano-Suiza engines is under service trial this fall, but does not look promising.

The standard Franco-Roumaine airplane is the Spad 46, with

the 375 HP. Lorraine Dietrich engine. The fuselage is a monocoque construction and will carry 5 passengers at a cruising speed of 87-90 miles per hour. A number of Potez airplanes with the same engine and approximately the same performance are also in use. Between Belgrade and Bucharest a three-engined Caudron equipped with Hispano-Suizas is in use in connection with the night flying trials; it is practically obsolete and is being replaced by new types of three-engined airplanes. The Farman "Jabiru" equipped with three 300 HP. Salmsons, a Caudron with three Salmson or Lorraine engines, and a Potez with three Salmsons or Lorraines are expected for delivery during the fall of 1924. From a commercial point of view none of these multi-engined airplanes looks very satisfactory as yet.

The Latecoere line at present is using a modified army observation airplane with open passenger cockpit, the Breguet 14 T with 300 HP. Renault, and occasionally a Farman 70 with the same engine. They have a large amount of old war stock in storage. On the seaplane service Liore et Olivier flying boats are employed, equipped with two Hispano-Suiza engines, but the wooden hull and the engines require too much maintenance.

All of the French lines appear overstocked with airplanes or are attempting to use too many different types for efficient service. The character of the subsidies is partly responsible for this.

Government Relations.

The Government bureau controlling the operation of French air navigation companies is the "Service de la Navigation Aerienne," of which Col. Casse is in charge. The sum of 41,422,000 francs was appropriated for subsidies for 1924. It is difficult to interpret this sum in terms of dollars as the prices of some articles have increased in proportion to the falling rate of exchange, while others have continued at the old value; perhaps $0.10 per franc may be taken as the most reasonable average exchange value.

The general basis of the subsidies is set forth in the "Cahier des Charges," while specific contracts with each company are approved separately. The numbers of the "Journal Officiel" (which corresponds to the Congressional Record" give these contracts. Subsidy payments are of three principal forms: a purchase premium amounting in general to half the first cost; a premium in proportion to the number of kilometers flown, increasing with the size of the airplane employed; and a premium in accordance with the useful or pay load which the airplane will carry. Thus the Air Union receives 15.75 francs for each kilometer flown with Goliaths and 7 francs for each kilometer flown with Breguets or Spads; in addition, 1.75 francs for each 200 kilograms of useful load capacity per flight. The Franco-Roumaine receives per kilometer flown 16.90 francs for Caudrons, 9.45 francs for Potezes and Spads, 5.60 francs for Salmsons,

and 2.36 francs per 200 kg useful load capacity. (Convert, for comparative purposes, at $0.10 per franc.)

In case the companies show a deficit at the end of the year an additional premium is paid to cover the loss, up to a maximum of one-half that already paid on the kilometer and useful load capacity bases. The life of the flying equipment is specified at 300 hours for airplanes, 200 hours for seaplanes and 150 hours for engines. This constitutes an additional indirect payment as the actual depreciation is much less. The government also in reality carries partial accident insurance on the flying equipment for the companies, for if the airplane crashes before completing its theoretical flying life, the purchase premium is paid at once. There are a number of other items in the subsidy agreements which materially affect the operations and receipts of the companies. French subsidies are the most complicated and liberal of any in Europe, and from the number of changes during the past years it is evident that they have not operated very satisfactorily. As a result the aggregate annual mileage of French commercial companies is greater than in any other country, but the organizations are less businesslike and efficient than the English, German or Dutch.

The present contracts are renewed annually; there is considerable propaganda, however, to place them on a long term basis. If this is done in a form comparable to that of the present subsidies it may retard the time when French companies will be able to operate without Government support. French railroads after

eighty years of operation are still subsidized by the state, as is also the merchant marine; and French air lines appear to be tending in the same direction.

In addition to direct payments, the government has gone to considerable expense in the installations at Le Bourget, the terminal airdrome for Paris; in the establishment of an elaborate meteorological system with hourly radio reports from numerous stations all over France; and in a number of other ways. An illustration of the character of these expenditures may be seen in the eleven huge reinforced concrete hangars at Le Bourget. The hangars are said to have cost 1,600,000 francs each at the time of their construction in 1921. They were built at a time when there was much speculation about large triplanes and are several times higher than their present use justifies. As a result they are very difficult to heat and a large additional hot air blower system has been installed. The hangar doors are operated by electric motors. Shops are installed in similar type buildings in the rear of each hangar.

The Director of the Franco-Roumaine stated that the objects of his company are: (a) to serve as a political connection with Roumania and other Balkan states; (b) to interest the Balkan countries in French aeronautical products; (c) to act as a laboratory for service, testing new types of airplanes, engines and equipment; and finally (d) to study long-distance aerial transportation, where present communications are in general disorganized.

It is on these counts that the government justifies its appropriations for commercial aeronautics. The Air Union serves principally to counteract the influence of English and Dutch lines flying into Paris; and the Latecoere line, to connect France with its colonies in North Africa.

General.

From a passenger's point of view, French airplanes with the possible exception of the Farman Goliath, are less comfortable than those of the English, German and Dutch. On the Spad 46 and Potez 9 airplanes of the Franco-Roumaine, no exhaust pipes are installed and the fumes from the engine collect in the passengers' compartment, often causing carbon monoxide poisoning. Under the present subsidy system there does not seem to be the proper stimulus for improvement. The Air Union, for example, has operated for several years with an engine so unreliable that any business concern would have replaced it long ago. The application of radio to the airplanes has lagged behind developments in England. In general, no special navigation equipment is carried, except for a gyro turn indicator on a few airplanes. A fire extinguisher system is compulsory, most of them being of the Hermann-Auclair type arranged to flood the carbureter with carbon tetrachloride in case of backfire; the operating personnel, however, appear to regard the installation of little value.

The method of supplying pilots with a graphical record of

the weather along the route before the airplane takes off is excellent. A chart is prepared with colored crayon indicating the elevation of the ground along the course by contour and the height of the clouds and wind speed at each intermediate station reporting by radio. This the pilot carries in the airplane and turns in at his destination with any comments or corrections.

The Franco-Roumaine on the routes between Strasbourg and Prague, and between Prague and Warsaw, is obliged to fly for considerable distances over German territory. As the restrictions on German aeronautical activities were extended beyond the original terms of the Versailles Treaty, the Germans have countered by refusing permission for French airplanes to fly over their territory. During 1923 a total of twelve airplanes of the Franco-Roumaine line made forced landings in Germany due to weather and other causes, and were confiscated. During 1924, some 200 flights had been carried out (February to August) without a single forced landing in German territory. Part of this increased reliability has been obtained by defaulting trips when the weather was particularly unfavorable. The lack of weather reports over these long sections is an additional handicap.

Information bulletins are published by the Franco-Roumaine Company from November 1, 1923, through June, 1924; these contain some excellent information on the detailed operating problems of this the largest French company. A bulletin gives the operating statement for 1923, and indicates that of the 18,511,000 francs gross income, only 1,073,000 francs represent traffic revenue,

the remainder being subsidy and miscellaneous payments from the French, Roumanian, Czech-Slovak, Polish and Yugo-Slavic Governments. Operating expenses for 1923 were divided in the following proportion:

	Per cent
Depreciation	25.3
Airplane maintenance	10.3
Engine maintenance	12.2
Fuel and oil	12.5
Insurance	4.2
Expenses in connection with traffic	12.4
General operating expenses	20.7
Automobile service	2.4
	100.0

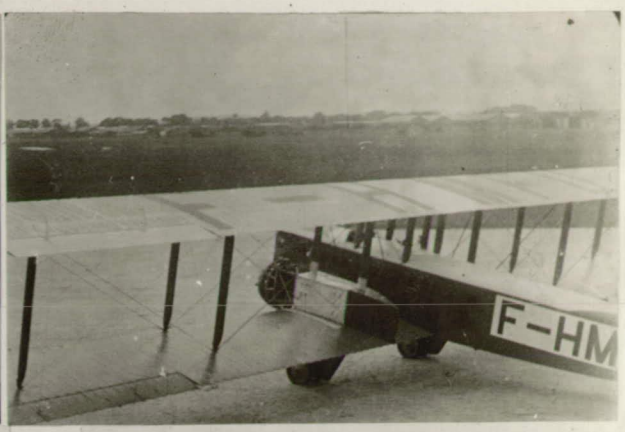
European cost figures, however, cannot be intelligently applied to conditions elsewhere without very careful interpretation as the rates of exchange, varying standards of living, wage scales, cost of materials, and the subsidy relations make direct comparison misleading. This applies with special emphasis to French operations.

The Franco-Roumaine has the poorest safety record of any of the large air transportation companies in Europe; but it probably operates over the most unfavorable routes. The Latecoere line is the one French company which compares favorably with those of other nations.

Inspection of commercial airplanes is carried out for the

government by the "Bureau Veritas," a semi-public organization which also is the official inspection agency for marine and railroad equipment. The "Compagnie d'assurances Le Zenith" is entering the airplane insurance field but has not yet established this service on a par with the British Aviation Insurance Group. Air Union airplanes, while using the old unreliable Salmson engine, have been unable to obtain insurance. A law has recently been passed (June 3, 1924) establishing the freedom of the air company from responsibility for goods or passengers, if so declared on the ticket or bill of lading.

Flood light installation at Le Bourget.
Arklight under hood; motor-generator set in shack



Farman Goliath with two Salmson C.M.-8 260 HP. engines.

Liore and Olivier seaplane with two Hispano-Suiza 180 HP. engines, at Oran Algeria; used by Latecoere line between Alicante Spain and Oran.

Brequet 14-t, standard airplane for Latecoere Line; at Alicante, Spain and Malaga. Note Streamlined containers for carring air mail.

Latecoere installation at Rabat and Casablanca, Morocco.

General view before hangers at Le Bourget, the terminal aerodrome for Paris.

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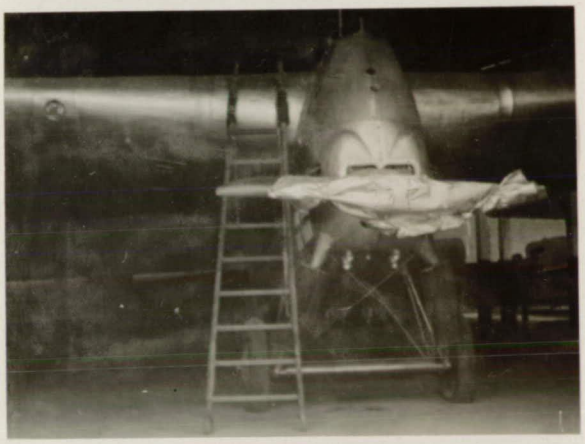
Latecoere inatallation at Casablanca, Morocco.

Hangar installation at headquarters of Latecoere Line, Toulouse, France.



At Toulouse field, L.A.T. 16 monoplane with 400 HP. Loraine-Dietrich engines, all metal.

Reinforced concrete hangars at Le Bourget, with electrically operated doors. Their tremendous height may be judged from the Spad 46 and Farman Goliath planes which are visible within.

French Nieuport-Astra at Croydon aerodrome.

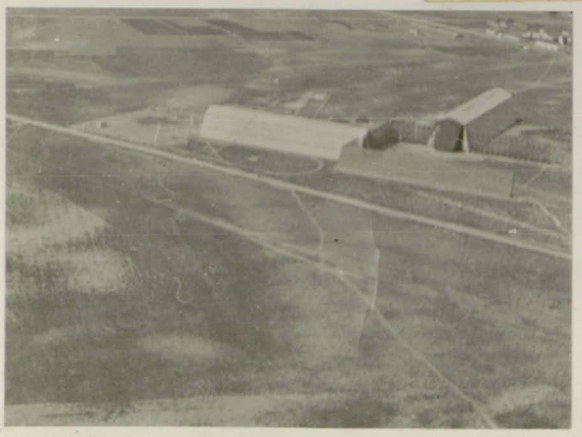
Installation at Strasbourg. Spad 46 with 400 HP. Loraine-Dietrich engine.

Bleriot passenger plane with 4 Hispano-Suiza 180 HP. engines, being tested at Le Bourget, Aug. 1924.

English Handley Page arriving at cement mat before customs building and restaurant, Le Bourget airport, Paris, France.

Farman Goliaths and Handley Page awaiting departure, at Le Bourget airport.

General view of customs building and resturant, office, and meterological building at Le Bourget airport, Paris.



Lighter-than-air hangers at Oran, Algeria.

Hanger of Latecoere line at Fez, Morocco.

G E R M A N Y

Operating Companies.

There are two controlling air transportation companies in Germany: the Deutscher Aero Lloyd Aktien Gesellschaft and the Junkers Luftverkehr. The former is the result of an amalgamation on February 6, 1923, of the majority of independent air traffic concerns which came into existence during the first years after the War. The list of its underwriters includes the names of the leading industries, shipping companies, business houses and banks of Germany, as: Hugo Stinnes, Thyssen, A.E.G., Hamburg Amerika, Nordeutscher Lloyd, Robert Meyhoefer, Deutsche Bank, etc.

The Junkers Luftverkehr is unique in European aeronautics as it represents an aircraft manufacturing company dominating an extensive system of air lines in order to create a market for the sale of its airplanes.

Among the subsidiaries of the Deutscher Aero Lloyd are the "Deutsch-Russische Luftverkehrs-Gesellschaft" known as "Deruluft," of which 50% of the capital is subscribed by the Russian Government; and the "SCADTA" which operates in Columbia, South America. The lines in which Junkers is especially interested are: the Trans-Europa-Union, operating in Central Europe and the Balkans; the Nord-Europa-Union, operating in the Baltic states; and a line which contemplates connecting Sweden with Persia via Moscow and Southern Russia.

Nature of Services.

The schedules and rates for German-controlled companies are given in time-tables and folders. Practically all lines advertise to carry passengers, mail or goods. Up to the present the services have only been regularly carried out during the summer six months of the year (April-September, inclusive). This acts as a serious obstacle in building up a mail and goods traffic and it is possible that in 1924 certain of the services may be continued throughout the year.

The principal lines operated by the Deutsche Aero Lloyd A.G. are: Berlin-Hannover-Amsterdam-London, on alternate days, flying the route in conjunction with Imperial Airways, to maintain a daily schedule; Copenhagen-Hamburg-Amsterdam in conjunction with the Dutch and Danish air companies; Berlin-Danzig-Königsberg-Kovno-Smolensk-Moscow through its allied company, Deruluft; a night mail courier from Berlin to Copenhagen via Stettin.

The Trans-Europa-Union operates between Geneva, Zurich, Munich, Vienna and Budapest; from Munich a branch line into Germany via Nuremberg and Frankfort on the Main; it is considering an extension of the Budapest line to Constantinople and is entering into active competition with the French, especially for Turkish concessions. The Nord-Europa-Union connects East Prussia with Finland and the intervening Baltic States, the route being Königsberg-Memel-Riga-Reval-Helsingfors. A seaplane service which was operated for a time between Stockholm and Helsingfors

has been suspended.

An experimental night mail courier service, similar to that of the Aero Lloyd, is being operated by Junkers between Berlin and Stockholm via Warnemunde. These two night services are receiving special Government subsidies for a three-months period during the summer of 1924, to obtain data on night operation, with the idea of applying the information on other more important lines.

Junkers has made an extended effort to obtain control of Russian air lines. Trial flights have been carried out on the Sweden-Persia line but it is understood that the service has never been in very regular operation and in September, 1924, Junker representatives stated that all other activities in Russia were at a standstill until the Russian Government could be prevailed upon to make good its guarantees.

Air Traffic.

The totals for the Deutsche Aero Lloyd for 1923 are given as follows:

	Berlin-London	Berlin-Königsberg	Königsberg-Moscow	Incidental flights	Totals
Flights carried out	575(857)	260	151	2336	3322
Miles flown	81000 (140000)	51000	115000	48800	295800
Passengers carried	497(960)	554	327	914	2292

	Berlin-London	Berlin-Königsberg	Königsberg-Moscow	Incidental flights	Totals
Mail carried (lb.)	3560 (6010)	364	3450	-	7374
Goods carried (lb.)	10560 (15300)	14	47800	11800	70174

(Figures in parentheses are inclusive of the traffic carried by the English Air Line with whom the London service is jointly operated.) These figures indicate that the amount of flying carried out by the Aero Lloyd is relatively small and that the mail and goods traffic is unimportant except on the Moscow line. The large figure for goods on the Königsberg-Moscow line represents the Russian diplomatic mail which is carried thrice weekly by diplomatic couriers, as baggage, and explains the Russian Government's interest in the service.

The Berlin-Königsberg line competes with an excellent overnight train service and as a result gets a negligible amount of mail and goods. The average reliability of flights is claimed to be 91.5 per cent.

Statistics recently published in the German press for Junkers Luftverkehrs for 1923 are as follows; but their accuracy cannot be vouched for:

	Regular scheduled flights	Special flights	Local flights	Totals
Distance flown, miles	545000	154500	93000	792500
Flying hours	6775	2053	1182	10011
Number of landings	3554	2000	5364	10918

	Regular scheduled flights	Special flights	Local flights	Totals
Passengers carried	8149	5363	12997	26509
Mail carried (lb.)	12530	255	-	12785
Goods " "	111200	23400	-	134600

The routes for which these figures apply are not stated but probably include the Trans-Europa-Union, the Nord-Europa-Union, and all other lines in which Junkers has a part. The percentage of scheduled flights carried through is claimed to be 89.2%. There appears to be a tendency on the part of the Junkers organization to considerably exaggerate the amount of flying undertaken with their airplanes.

Records of arrivals and departures at the Königsberg airport obtained from the local customs office, are as follows:

Period of January 1, - July 31, 1924.

(Regular services commence May 1st)

Number of passengers	1801
Passengers' baggage (lb.)	14480
Russian courier baggage (lb.)	19100
Merchandise	3320
Mail	4950
Regular trips	457
Special trips	8
Test flights and joy rides	477
Number of landings	711
Number of take offs	719

Since Königsberg is the terminus for the Moscow route, the Nord-Europa-Union, and the Danzig-Berlin line, these figures are a good indication of the aggregate flying on these routes for approximately three months' regular operation during the present year.

Under the present plan of operating regularly only six months of the year, passengers represent the major part of the traffic for practically all the German lines. In general, Germans appear to take very readily to air travel, more so than any other nationality in Europe. The excellent safety record of the German services to date may partly account for this.

Flying Equipment.

The terms of the Versailles Treaty limit the size of airplanes and the horsepower of engines which may be employed, and considerable resentment is evidenced throughout Germany at the continuation of restrictions on commercial aircraft. As a result, no new types of commercial transport airplanes of any permanent importance are in operation in Germany.

The Deutsche Aero Lloyd has approximately 24 airplanes, most of them obsolescent types taken over at the time of the amalgamation of the former companies. Herr Wronsky, the Director, states that the Fokker F III (with Siddeley Puma 240 HP. or Eagle 8 Rolls Royce English engine) is the most satisfactory of those now in use on his lines. They have recently built 6 Fokkers in their shops at the Staaken airport. In addition, the

Junkers airplane equipped with a Siddeley Puma in place of the usual B.M.W. engine, is in use on the Berlin-Königsberg route; the Dornier Comet on the London route; a Fokker F II on the night mail courier service to Copenhagen; and Sablatnig, Albatross, A.E.G. Rumpler, and other old war type airplanes for school, photographic and special flights. The "Deruluft" Moscow service has 8 Fokker F III's with 14 Rolls Royce engines. (An English mechanic from the Rolls Royce factory is in charge of engine maintenance at Königsberg.)

Junkers continues to build the all-metal duralumin limousine F-13 (better known in America as the "JL 6") with apparently no important modifications in the last five years. The Junkers factory is located in Dessau and much of the repair work for the lines employing these airplanes is carried out there during the winter months when flying is suspended. The F-20 with B.M.W. engine (see accompanying photographs) is used for the night courier service between Berlin and Stockholm. It is stated that Junkers in rebuilding the B.M.W. has increased the compression to 6-1 and otherwise modified the engine to give 250 HP.

A three-engine all-metal monoplane similar in general lines to the F-13 has been constructed at Junkers Dessau plant and was ready for its trial flights early in September, 1924. Two 100 HP. Mercedes are installed on the wings and a 200 HP. B.M.W. in the nose. German operators generally claim that as long as they are restricted to such small power plants they cannot build commercially efficient aircraft.

The specifications for the Junkers with the Siddeley Puma 240 to 255 HP. engine are:

Light weight	2480 lb.
Pilot, gas and oil	870 "
Net useful load	750 "
Weight loaded	4100 "

For the Dornier Comet with the same engine:

Light weight	3150 lb.
Pilot, gas and oil	840 "
Net useful load	660 "
Weight loaded	4650 "

Government Relations.

As in the other countries of Europe, Government aid is in two forms, direct and indirect. Direct aid is in general by means of an air mail contract; the Government pays a fixed amount in accordance with the number of flights and useful carrying capacity of airplanes operated on specified routes during six months of the year. The company agrees to carry up to a maximum of 100 kg of mail per trip if it is offered. The actual receipts from the sale of air mail postage go to the state so that when the average load of air mail develops to 100 kg for each flight undertaken, the government will receive an income proportional to its payments to the air transportation company. At present the air mail nowhere approaches this volume and the

mail contract is thus practically a pure subsidy.

Due to the fluctuation of the mark, the government has frequently made its payment in kind, usually about 2 kg of gasoline per kilometer flown, or an equivalent value. Other additional subsidies for special operations are accorded from time to time, as in the case of the two night courier services from Berlin to Copenhagen and to Stockholm, already mentioned.

Indirect aid is of the same type as in France and England, although considerably less elaborate. Government wireless communications are available free of charge to air transport companies; hourly weather reports are sent out by radio from Königsberg, for example, to Moscow, Riga, Reval, etc. The field at Königsberg is the property of the city and has excellent facilities with meteorological office, customs, and so forth. At Danzig the field is the property of the Danzig Free State Senate. At Berlin the present field at Staaken is understood to be the property of the Zeppelin Company. The big airship hangar is now employed as a motion picture laboratory, and the other hangars and shops are rented by the Deutsche Aero Lloyd. The Staaken field is too far out (12.5 miles) and the city of Berlin has donated Tempelhofer Feld, which may be reached by street car from Unter den Linden in about twenty minutes. A company has been organized consisting of the municipality, the government, the air transport companies and interested citizens, and an extensive installation is in process at the new field. The Junkers Company

is already installed and operates its night courier service from Tempelhofer Feld. The method by which these municipal airports have been created might be studied with profit by this country.

General.

The German lines in general are being operated with the very minimum of equipment and personnel, as their subsidy is by no means as liberal as in France or England. The daily service between Königsberg, Danzig and Berlin (400 miles) is operated with three airplanes and three pilots, which is sufficient only in case unforeseen emergencies do not arise. The Trans-Europa-Union maintain a twice daily schedule between Vienna and Budapest, using 4 Junkers seaplanes and with no reserve engines. During my stop in Vienna one of the services had been suspended for two weeks because two of the engines were being overhauled, and the engines had been shipped to Munich for this work. The contrast is striking on the Balkan route, between the liberal installations of the French line and the skeleton organization of the Germans. Yet the Germans have certainly operated with a better safety record than the French, probably just as regularly, and without question, much more economically.

One is impressed throughout with the genius of Germany for organization; with the restrictions on aeronautical development once removed, they are certain to be formidable competitors for the dominance of European air transportation lines. For this

they are geographically very strategically located.

The Deutscher Aero Lloyd is organized for operation purposes only, similar to a steamship company, and buys its equipment wherever it can find that best suited to its needs; thus, it now employs, among others, Dutch airplanes and English engines. Junkers, on the other hand, is primarily interested in building airplanes, and seeks in air transportation a field in which to sell his product. The two companies are antagonistic in principle and are not on friendly terms. Junkers has expended great effort in propaganda and literature which it is claimed is justified as an "investment in good will" for his product; but this heavy over-head charge must be met somewhere, and it is certain that the commercial receipts of the air lines cannot absorb it. In the case of the Polish line, Junkers airplanes have been sold to the company on a long term installment basis.

The experience with the effective life of duralumin all-metal airplanes is of special interest; one of the airplanes in regular operation on the Königsberg-Reval line had a number plate indicating construction in 1919. Of the three Junkers in service at Warsaw, one was built in 1920, and two in 1922. It was claimed that the 1920 airplane had been operated an average of 800 flying hours a year since its construction without changing the wings. The Polish chief pilot stated that a Junkers airplane cost about three times more than a Potez ("stick-and-wire" French airplane), but that it would fly at least four times

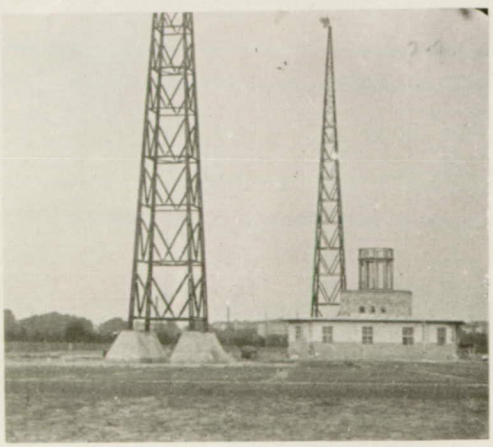
longer. The actual amount which these airplanes have flown may b somewhat exaggerated, but it is evident that the life of a duralumin airplane, under certain conditions, may be measured in thousands of hours. The English, however, have obtained over 1500 hours with their "stick-and-wire" aircraft; and the Dutch a similar record with their welded steel tube airplanes. It appears that in a comparison of the different types of construction with regard to their relative useful service, a number of related factors must be considered, as: the initial comparative investment; the rapidity with which the vehicle may become obsolete or inadequate; the ease of maintenance and repair, having in mind the facilities available along the route where the airplane is to be operated; the character of weather likely to be encountered; the availability of shelter; and a score of other aspects.

Municipal hangar and Customs building at Konigsberg, East Prussia.

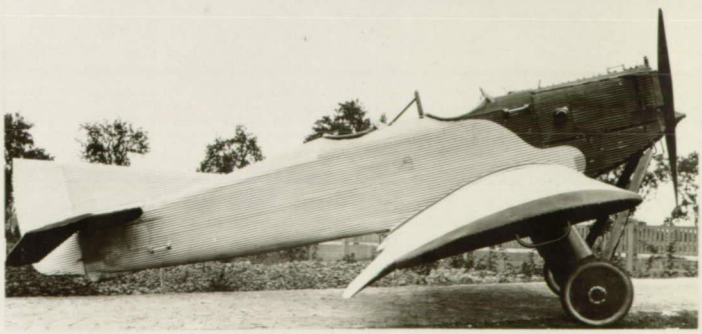
Resturant and office building at Danzig.

Danzig customs officer and Junkers F-13, with B.M.W. engine, which just arrived from Konigsberg.

View of night mail courier airplane.



New headquarters construction at Tempelhofer field, Berlin, Germany. The radio towers are of wood.



Junkers F-30 used in night courier service between Berlin and Stockholm.

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H O L L A N D

Operating Companies.

There is one Dutch air transportation enterprise operating in the Netherlands at the present time; and in addition, an English, French, Belgian, Danish, and German company in conjunction or in competition, on one or more of the routes. The "Koninklijke Luchtvaart-Maatschappij" or Royal Dutch Air Service Company grew out of an international aviation exhibition organized at the close of the war by Mr. Plesman, a young officer in the Dutch Air Service. Patriotic business leaders felt it important that Holland's failure to take part in the war should not exclude her from a share in European air activities, and Mr. Plesman was successful in 1920 in interesting the largest shipping houses, banks and steamship lines (for example, the Holland-American) in organizing an experimental air transportation service on a small scale. The company has developed until today it is one of the best organized and most reliable in Europe.

Nature of Services.

The Royal Dutch Air Service Company operates a daily passenger, mail and goods service between Amsterdam, Rotterdam and London; Rotterdam, Amsterdam, ... Hamburg and Copenhagen, in conjunction with the German and Danish companies; and a daily round trip between Amsterdam, Rotterdam and Paris. The Copenhagen

route was operated regularly for the first time this summer and was suspended in October for the winter. The London-Paris lines have been operated throughout the year for the past two years.

Air Traffic.

The growth of the service may be seen in a comparison of the traffic for the past three years, as follows:

	1921	1922	1923
Passengers	1664	1414	3937
First-class mail matter (lb.)		2280	3760
Parcel post	3410	6040	16090
Merchandise (lb.)	85600	199200	366500

The traffic statistics for the first eight months of 1924 are as follows:

K.L.M. Traffic.

January-August, 1924, inclusive (weights in lb.)

	Amsterdam-Rotterdam-London	London-Rotterdam-Amsterdam	Amsterdam-Rotterdam-Paris
(1) No. of passengers	589	489	394
(2) Letter mail (lb.)	332	427	165
(3) Parcel post (lb.)	3430	6530	-
(4) Merchandise (lb.)	34300	40700	23300

K.L.M. Traffic (Cont.)

January-August, 1924, inclusive (weights in lb.)

	Paris-Rotterdam-Amsterdam	Rotterdam-Amsterdam-Hamburg-Copenhagen	Copenhagen-Hamburg-Amsterdam-Rotterdam
(1) No. of passengers	393	244	255
(2) Letter mail (lb.)	399	280	586
(3) Parcel post (lb.)	-	3120	2110
(4) Merchandise (lb.)	95600	20800	834

Totals: (1) 2364; (2) 2189; (3) 15190; (4) 215534.

This latter table indicates strikingly how the air mail has failed to develop, and also the predominance of Paris as an exporting center for air express. The difficulty of balancing inbound and outbound loads will be evident from a study of these figures.

A route such as Rotterdam-Amsterdam-Hamburg-Copenhagen, presents considerable difficulty from a traffic point of view, for if a passenger is accepted from Rotterdam to Hamburg, for example, it is very unlikely that his place will be occupied from Hamburg to Copenhagen. On the other hand, if the airplane is filled at its first stop, the intermediate fields are unable to take care of their local patrons. The Franco-Roumaine faces exactly the same difficulty on its line to the Balkans. A route with a number of intermediate stops for receiving or discharging traffic is not advantageous to operation, in view of the present

small size unit carrier and small number of trips a day; neither is a route where the high grade traffic is predominantly all one way. Thus, there is a contract with one dealer for from 150 to 350 lb. of flowers to be carried daily from Amsterdam to Hamburg, which might have been many times increased if it had not been necessary to reserve space for other types of cargo and from other shipping points. Passengers from Amsterdam to Copenhagen must be booked through the Rotterdam office.

Much gold bar and currency travels between London and Holland by air. Holland exports frequent shipments of electric and radio bulbs from Rotterdam to both Paris and London, and flowers, by air, as far as Danzig.

Flying Equipment.

The K.L.M. has operated to date exclusively with Fokker airplanes. In September, 1924, the fleet consisted of 11 airplanes, of which 8 were F III, 2 F II, and 1 F VII. Three additional F VII's were under construction at the Fokker-Amsterdam plant and an experimental three-engined airplane at the Koolhoven factory in The Hague. The capital cost of the F III is said to be about 27,000 to 30,000 guilders ($10,000 to $12,000); 900 hours was originally assumed as the flying life of the equipment, but has been found to be considerably under-estimated, so that most of the airplanes now in use have already been written off on the books. Mr. Guillonard, Chief of the Technical Department, believes that the useful life of an airplane is a function of the

total time involved, as well as the number of hours in the air; if airplanes could be operated as much as ten hours per day, it is his opinion that they might last for 5000 to 10,000 flying hours. At present, about 500 hours are flown between each thorough airplane overhaul. Mr. Guillonard states that at least 30% of the number of airplanes in daily flight are necessary as reserves to insure a regular service, while the number of extra engines required depends primarily on how fast they can be overhauled in the shops and returned to the line. In redesigning the engineering installation, he is planning on an engine shop to handle 300 engines hours per week, giving more room to engine repair and considerably less to airplane repair. For the size of airplane and type of service they are operating, the K.L.M. believe that the welded steel tube construction is the cheapest to buy, maintain or repair. It was stated that much trouble was experienced at first because of the poor quality of workmanship and material in the airplanes, but that this had been obviated by testing or inspecting every part in the factory before installation.

The F III with the Siddeley Puma engine carries about 950 lb. of pay load at a cruising speed of 80-85 M.P.H., and a rate of climb of about 250 feet per minute (1.3 meters per second). The F VII with a 360 HP. Eagle IX, has a still lower rate of climb, a high speed of 92 M.P.H., a cruising speed of 80 M.P.H. Its average ground speed for the month of August, in regular operation

between Amsterdam and London, was 70 M.P.H. (112 km/hr.). With two pilots, the actual pay load allowed at the Amsterdam airdrome was 1190 lb.; at Croydon, because of the poor rate of climb, 1080 lb. The gas capacity is 720 liters, and the allowance for the Eagle IX is 105 liters per hour, or a maximum range of 6-3/4 hours. This large gas capacity is intended to fit the F VII for a flight to the Dutch East Indies, leaving Holland in October, 1924. In practice about 600 liters are carried. It is of interest to note that in remodeling the airplane at Rotterdam for the East Indies flight, 192 lb. were gained by removing the passengers' seats, triplex glass in the cabin, lavatory, and so forth. It appears that an airplane designed strictly for goods service will save 5% or more of the light weight of the same airplane equipped for passenger service. There are about 240 cu.ft. in the passenger compartment and, together with the luggage compartment and lavatory, about 350 cu.ft. The cabin is as spacious and comfortable as any single airplane in operation on European lines, but the low cruising speed and poor rate of climb make it unsuitable for commercial operation except under special conditions. In the new F VII the entire undercarriage is to be modified, giving a wider tread and suppressing the floating axle. A thick wing monoplane of this type appears difficult to taxi, even in a moderate wind.

The "F.K.31" which Koolhoven has under construction for the K.L.M. for delivery in January, 1925, is a thick wing monoplane

built around 3 Siddeley Puma engines. It is a radical departure from the conventional 3-engine design, 2 Pumas being installed on a short root wing at the base of the unusually large fuselage, and the third engine on top of the main wing. Several advantages are claimed for this: all three propellers and slipstreams are entirely independent; the fuselage is not in the slipstream; all three engines may be readily removed and are easily reached for inspection and maintenance; by the triangular principle of installation, the unbalanced torque is not excessive in case one engine cuts out, and so forth. The airplane is not greatly dissimilar to the Farman "Jabiru" as redesigned for the Franco-Roumaine around three Salmsons in place of the original four Hispano Suizas. Specifications are for 11,000 lb. total weight, 1040 sq.ft. total area, 81 ft. span, 400-500 cu.ft. in the fuselage, and a cruising speed of 94 M.P.H. (150 km/hr.). Koolhoven claims that official French tests have shown that the central engine in the conventional 3-engine installation (one in the nose of the fuselage and one on either side on the lower wing) operates under conditions which make it very inefficient and that its effect on the speed of the airplane may be less than 10% with throttle open or closed. The F.K.31 is one of the most interesting present attempts in Europe to produce a strictly commercial airplane, and by the early summer of 1925 flight records on its performance should be available. This contract is entirely between the K.L.M. and the Koolhoven factory, and the government

is not involved, as is the case in England and France.

Government Relations.

The original Government relations of the K.L.M. were rather unusual. The company commenced operations without any subsidy; when a deficit occurred in the first year the government was appealed to and an appropriation of 200,000 guilders ($80,000) was voted to cover this loss and the estimated deficit for the following year. This amount was found to be insufficient and an additional 325,000 guilders ($130,000) was granted.

In 1922-23 the subsidy was put on a more definite basis. The company was required to increase its capital from 1,000,000 to 1,500,000 guilders ($400,000 to $600,000) and an advance without interest amounting to $560,000 was granted for a period of four years, as follows:

For 1923,	$160,000
1924,	160,000
1925,	120,000
1926,	120,000

This readjustment occurred at a time when the post-war economic depression was general in Holland, and it is indicative of the interest in air transportation that the additional capital was found and the appropriation voted under such conditions. The specifications for the subsidy are reduced to a minimum: a daily service on the London and Paris routes, with extensions later to Hamburg.

In General, the K.L.M. is less closely related to its government than any other air line in Europe. There are two major commercial fields in Holland: Schipol airdrome at Amsterdam, and Waalhaven at Rotterdam. Schipol is a former military field and the buildings are rented by the company from the government. (A portion of the hangar was in use September, 1924, for assembling and testing Fokker C IV's for the Dutch Air Service.) The Waalhaven field was created by the city of Rotterdam as a municipal airport and is one of the best installed fields in Europe; it is on land reclaimed by the city in connection with its harbor projects. The installation is said to have cost about $600,000. A new Marconi 1.5 kw radio set is being installed by the government.

To reduce the field operating expenses, the K.L.M. field managers also act as local directors for the municipalities; this, of course, would hardly be possible were not the K.L.M. the only Dutch company operating at the fields.

A hotel and excellent restaurant are maintained at both fields and are said at least to cover operating expenses by revenues. During the summer the fields are a source of much popular interest and special rates are made to induce clubs and societies to patronize the restaurants and to take short flights.

Holland is not a signatory to the Air Navigation Convention, but the K.L.M. in practice meets the conditions therein specified in order to simplify its relations with the foreign countries in which it operates.

General.

The total expenses for 1923 are given as about $280,000 and the aggregate commercial receipts as $120,000, the difference being covered by the subsidy. This would indicate that over 40% of the expenses were met by revenue from operations, which is a higher figure than for any other line in Europe. The Imperial Air Ways budget, for example, for 1924, estimates about 35% of expenses covered by commercial receipts; while in 1923 less than 6% of the total income for the Franco-Roumaine was from operations.

The K.L.M. has been conducted on a strictly business basis; up to this summer it had operated an aggregate of over 1,000,000 miles without a single passenger fatality. In May, 1924, an airplane with two passengers which left London for Holland in rather bad weather evidently was lost in the Channel or off the Dutch coast, as it was never heard from again. This loss has prompted the company to undertake the installation of radio telephone sets on all its airplanes.

Some of the equipment has been obtained at extremely low prices: 7 Siddeley Pumas were recently purchased at $550 each; others have been acquired at prices ranging from $1800 down to $135. A complete overhaul of the airplane is estimated at from $800 to $1600. No insurance is carried, but an insurance reserve is set aside equal to about 25% of the investment in flying equipment.

The economical operation of the K.L.M. has resulted in part undoubtedly from its refusal to engage in any speculative ventures unrelated to its main operations. In this respect it has differed from practically all other European lines, which at one time or another have invested heavily in wholly unprofitable undertakings. This policy, however, has apparently been modified, as a pioneering flight to the Dutch East Indies is to be undertaken during the fall of 1924. The flight is being financed by the government, the K.L.M., and leading East Indies shippers.

Approximately 10 pilots are employed and the annual flying time per pilot averages between 400 and 600 hours. In the opinion of Mr. Dellaert, in charge of flying operations, 650 hours per year is about the full normal capacity of a commercial pilot. French pilots average less than this, and English pilots more.

The annual report of the K.L.M. for 1923, states that the frequency of service was 86%, 12½% of the scheduled flights being wholly or partially prevented on account of bad weather; 1% due to defects in the material; and 1/2% on account of technical difficulties.

The organization and operations of the K.L.M. are of considerable value in a study of air transportation, as the service is less dominated by Government and subsidy relations than most of the other Continental lines. It is seriously limited, however, in being obliged to operate over a number of foreign countries and to compete for foreign traffic with other national air lines. The region is also one of unusually unfavorable weather during the winter months.

Installation at Waalhaven aerodrome, Rotterdam, Holland.

Fokker F-III with Siddeley Puma engine and Belgian operated Handley Page, at Rotterdam aerodrome.

Fokker F-III with Siddeley Puma engine

Fokker F-III arriving at Croydon aerodrome, England.

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A P P E N D I X

TABLE I. Accumulated Mileage in the Operation of Regular Air Transportation Services.

TABLE II. Aggregate Passenger Traffic on Regular Air Transportation Services.

TABLE III. Aggregate Mail Traffic on Regular Air Transportation Services.

TABLE IV. Aggregate Goods Traffic on Regular Air Transportation Services.

Data prepared by Lt. Van Zandt, Nov. 1924, to indicate the accumulated experience in the operation of regular air transportation services, European, Non-European and United States.

TABLE I

Accumulated Mileage in the Operation of Regular Air Transportation Services.

(Data Prepared by Lt. Van Zandt, Nov. 1924, to Indicate the Accumulated Experience in the Operation of Regular Air Transportation Services.)

EUROPEAN ROUTES	1918	1919	1920	1921	1922	1923	1924
Britain (1)		168,000	599,000	259,000	778,000	1,004,000	
France (2)		166,000	533,000	1,470,000	1,750,000	2,120,000	
Denmark (3)						56,200	
Hungary (4)						25,600	
Germany (5)		358,000	118,000	423,000	754,000	946,500	
Holland (6)			90,000	160,000	372,000	688,000	
Belgium (7)			?	177,500	?	?	
Sweden (8)							
TOTAL EUROPEAN MILEAGE		692,000	1,340,000	2,489,500	3,654,000	4,840,300	Estimated 5,500,000

AGGREGATE - 13,015,800.

(1) Table A - Air Ministry Annual Report.
(2) Total for all French Air Lines, European Report, Lt. Van Zandt.
(3) British Air Ministry Annual Report, p. 41.
(4) British Air Ministry Annual Report, p. 47.
(5) N.A.C.A. June, 1922, - German Traffic Ministry, per M.I.D., - European Report, Lt. Van Zandt.
(6) European Report, Exhibit K, Lt. Van Zandt.
(7) Air Ministry, 1922, p. 21.
(8) No reliable statistics.

TABLE I (Continued)

Accumulated Mileage in the Operation of Regular Air Transportation Services.

(Data Prepared by Lt. Van Zandt, Nov. 1924, to indicate the Accumulated Experience in the Operation of Regular Air Transportation Services.)

NON-EUROPEAN ROUTES	1918	1919	1920	1921	1922	1923	1924
Australia(1)						307,043	(Part in 1922)
Columbia (2)				56,600	126,900	186,000	(Doubled 1st half year)
U. S. P.O. Air Mails (3) (Miles Traveled with Mail)	81,898	393,066	864,128	1,713,934	1,570,089	1,545,280	2,155,761
Allowance for Misc. Routes as Cairo, Bagdad; Seville, Larache; Buenos Aires; Montevideo; Detroit; Cleveland; Key West, Havana; Seattle, Victoria, etc.	Conservative estimate				100,000	150,000	
TOTAL NON-EUROPEAN MILEAGE	81,898	393,066	864,128	1,770,534	1,796,989	2,188,823	Estimated 2,755,761
GRAND TOTAL	81,898	1,085,066	2,204,128	4,260,034	5,450,989	7,028,623	Estimated 8,355,761

AGGREGATE to Jan. 1, 1924. - 20,110,740 miles.

(1) Air Ministry, 1924, p. 35.
(2) M.I.D. - German Traffic Ministry.
(3) P. O. Consolidated Statement.

TABLE II

Aggregate Passenger Traffic on Regular Air Transportation Services.

EUROPEAN ROUTES	1919	1920	1921	1922	1923	1924
Britain (1)	1,155	5,754	5,692	11,460	15,013	
France (2)	588	1,711	10,619	9,502	11,638	
Holland (3)		345	1,674	1,414	3,937	
Denmark (4)					414	
Hungary (5)					542	
Germany (6)	842	492	2,864	7,730	14,890	
Belgium (7)		495	2,596	1,367	2,491	
Sweden (8)						
Poland (8)						
TOTAL EUROPEAN PASSENGER TRAFFIC	2,585	8,797	23,445	31,473	48,925	
(Total for five years - 115,225)						
NON-EUROPEAN ROUTES						
Australia (9)					1,363	(Part in 1922)
Columbia (10)			379	1,133	1,396	(doubled in 1st half year.)
Allowance for Misc. Routes as Key West, Havana; Miami, Nassau; Detroit, Cleveland; Buenos Aires, Montevideo, etc. estimated			400	600	1,000	
TOTAL NON-EUROPEAN PASSENGER TRAFFIC			779	1,733	3,759	
GRAND TOTAL	2,585	8,797	24,224	33,206	52,684	Estimated for 1924 62,000
AGGREGATE to Jan. 1, 1924 - 121,496.						

(1) Table A - British Air Ministry Report.
(2) European Report - Lt. Van Zandt.
(3) N.A.C.A. European Report - Lt. Van Zandt.
(4) Air Ministry Report, p. 41.
(5) Air Ministry Report, p. 47.
(6) N.A.C.A., M.I.D., European Report, Lt. VanZandt
(7) N.A.C.A.
(8) No reliable statistics.
(10) M.I.D. - German Traffic Ministry.
(9) Air Ministry, 1924, p. 35.

TABLE III.

Aggregate Mail Traffic on Regular Air Transportation Services.

EUROPEAN ROUTES	1918	1919	1920	1921	1922	1923	1924
	lb.	lb.	lb.	lb.	lb.	lb.	lb.
British (1)							
French (2)		2,060	34,500	76,800	369,000	712,000	
Holland (3)			6,530	3,410	8,320	19,850	
Germany (4)		47,600	13,200	40,000	*	20,159	
Belgium)							
Sweden) (5)							
Poland)							
TOTAL EUROPEAN AIR MAIL TRAFFIC		49,660	54,230	120,210	377,320	752,009	
	(Total for five years - 1,353,429 lb.)						
NON-EUROPEAN ROUTES							
Australia (6)						8,710	(Part in 1922, 25 letters to a lb.)
Columbia (7)				4,070	10,660	17,060	(Doubled 1st ½ yr.)
U.S. P.O. Air Mail (8)	118,006	441,742	774,387	1,165,807	1,512,197	1,688,500	
Allowance for Misc. Routes as, Seattle, Victoria; Key West, Havana; New Orleans, Pilot Town; Cairo, Bagdad; etc., estimated.			10,000	20,000	30,000	50,000	
TOTAL NON-EUROPEAN ROUTES	118,006	441,742	784,387	1,189,877	1,552,857	1,714,270	
GRAND TOTAL	118,006	491,402	828,617	1,310,087	1,930,177	2,466,279	Estimated, 1924 3,000,000
	AGGREGATE to Jan. 1, 1924 - 7,144,570 lb.						

(1) Included under goods.
(2) European Report - Lt. Van Zandt.
(3) European Report - Lt. Van Zandt.
(4) N.A.C.A., European Report - Lt. Van Zandt.
(5) No mail statistics.
(6) Air Ministry, 1924, p. 35.
(7) German Traffic Ministry, Dec. 1923, M.I.D.
(8) P. O. Consolidated Statement.

* Included under goods.

TABLE IV

Aggregate Goods Traffic on Regular Air Transportation Services.

EUROPEAN ROUTES	1919	1920	1921	1922	1923	1924
	lb.	lb.	lb.	lb.	lb.	lb.
British (1)	92,000	249,000	53,200	432,800	854,200	
French (2)	18,600	169,600	576,000	1,224,000	2,133,000	
Holland (3)		48,400	85,600	199,200	366,500	
Hungary (4)					10,671	
Germany (5)	159,000	2,000	21,800	*143,800	192,974	
Belgium (6)		10,100	56,200	126,300	276,000	
Denmark (7)					91,000	
TOTAL EUROPEAN GOODS TRAFFIC	269,600	479,100	792,800	2,126,100	3,924,345	
NON-EUROPEAN ROUTES						
Australia (8)					12,797	(Part in 1922)
Columbia (9)			63,200	192,400	248,000	(1st ½ yr. doubled)
Allowance for Misc. Routes such as: Key West, Havana; Detroit, Cleveland; Buenos Aires, Montevideo; etc., estimated			20,000	30,000	50,000	
TOTAL NON-EUROPEAN ROUTES			83,200	222,400	310,797	
GRAND TOTAL**	269,600	479,100	876,000	2,348,500	4,235,142	Estimated for 1924 5,400,000

(1) Table A - Air Ministry Report (Includes mail.)
(2) European Report - Lt. Van Zandt.
(3) N.A.C.A.; European Report - Lt. Van Zandt.
(4) European Report - Lt. Van Zandt.
(5) N.A.C.A.; M.I.D.; European Report - Lt. Van Zandt
(6) Consul's Letter, Aug. 6, 1924, Van Zandt.
(7) Commerce Report, 1924.
(8) British Air Ministry, 1924, p. 35.
(9) German Traffic Ministry, 1924.

* (including mail.)

** Aggregate to Jan. 1, 1924, 8,208,340 lb.


EUROPEAN AIR SERVICES - 1924
KEY
BRITISH
FRENCH
BELGIAN
DUTCH
GERMAN
JUNKERS GROUP
AEROLLOYD
DUTCH-GERMAN-DANISH
SWEDISH
POLISH
HUNGARIAN
Helsingfors
Reval
Moscow
Riga
Memel
Smolensk
Konigsberg
Danzig
Warsaw
Copenhagen
Malmo
Hamburg
Bremen
Amsterdam
Berlin
LONDON
Rotterdam
Hanover
Southampton
Cologne
Brussels
Guernsey
Frankfort
Prague
Cracow
Lemberg
Paris
Nurnberg
Strasbourg
Vienna
Munich
Basle
Budapest
Zurich
Geneva
Belgrade
Bucharest
Toulouse
Antibes
Marseille
Perpignan
Ajaccio
Barcelona
Constantinople
Alicante
Malaga
Tangier
Algiers
Oran
Rabat
Casablanca
Biskra