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AIR EXPRESS: DEVELOPMENT AND SERVICES*

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I. INTRODUCTION

Few persons will deny that, today, speed is the first requisite of any transportation service. It is no wonder, then, that many business houses are shipping goods rather regularly by air express—used formerly only in cases of extreme emergency. There are still many important items of an “emergency” nature, such as machinery parts; parts of automobiles, radio, and electric motors; oil-well supplies and replacements; serums, medicines, and surgical instruments; pass-ports and tickets which have been forgotten by travellers; news photos, valuable papers, political campaign literature, samples and innumerable other articles.¹ These shipments are of such volume that, if all were sent by air express, the present facilities of the airlines would no doubt be inadequate to transport them.² There are many other goods that could well be carried by air express.

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1. *F. Haag, Jr.*, “Commodities Moved by Air Transportation” (Calendar Year 1930), Bureau of Foreign and Domestic Commerce, U. S. Dept. of Commerce.

2. Cf. *M. C. Abrams*, “A Unified Air Express Service,” 31 *Aviation* 287 (1932).

The rapid carriage of goods, apart from baggage, may be classified as "air express" and "air freight." The terms are self-explanatory and follow the distinctions made between express and freight carried by rail. The reason for offering an air freight service is due largely to the rapid obsolescence of aircraft. Competition has forced the airlines to use the most modern and the swiftest aircraft for passenger traffic. As planes are replaced by newer models, the old ones—sound structurally—can be utilized in the air freight service.³ Since the original cost of this equipment has been generally written off prior to replacement, it can be used for purposes of air freight at a cost not greatly in excess of the cost of actual operation and maintenance.⁴

The purpose of this study is to consider the development of air express, the services it renders, the legal problems arising out of the express contract and carriage of goods by air. This first article will be confined entirely to the first two questions.

II. COMMODITIES CARRIED BY AIR EXPRESS

Volume of Commodities:

The total volume of articles, carried by scheduled domestic and foreign airlines of the United States as air express, increased from 3,555 pounds in 1926⁵ to 1,600,821 pounds in 1932.⁶ Private air express carried by the Ford Motor Company in 1926 amounted to 1,729,535 pounds and in 1931 to 1,532,156 pounds.⁷ In 1932 the Air Corps air transport supply service carried 1,003,578 pounds of material for use in its various flying activities.⁸

Correspondingly, 5,782 passengers were carried on scheduled airlines in 1926⁹ as compared with 540,681 in 1932.¹⁰ In 1926 a total of 810,855 pounds of air mail was carried and in 1931 this amount carried in domestic commerce increased to 9,097,411

3. Editorial, 13 *Airway Age* 4 (July 25, 1931). See also: "T. & W. A. to Run All-Express Line," 13 *Airway Age* 3 (July 25, 1931).

4. See Section V, "Air Express Rates," *infra*.

5. 3 *Air Commerce Bull.* 558 (1932).

6. "Air Lines Show Increases in Passenger and Express Traffic, Decrease in Air Mail," Special Bulletin, Aero. Branch, Dept. of Commerce (Feb. 1933). In 1931 the Railway Express Agency handled 135,371,691 rail shipments and in 1932, 103,876,568. From a survey made five years ago the average shipment weighed 68 pounds. This average has probably changed somewhat since then: from letter from *Charles A. Lutz*, Vice-Pres., Railway Express Agency, of Feb. 28, 1933.

In 1931, 1,151,348 pounds were carried by airline express: *loc. cit.*, note 5.

7. *Loc. cit.*, note 5.

8. Letter from Information Division, Office of the Chief of the Air Corps, U. S. Army, Feb. 16, 1933.

9. *Loc. cit.*, note 5, p. 559.

10. *Loc. cit.*, note 6.

pounds¹¹ and dropped to 7,393,257 pounds in 1932.¹² It is thus evident that air express is doing its share to keep pace with aviation improvement.

Kinds of Commodities:

Information is meagre as to what has been carried and in what directions the movements operated. However, from available statistics it appears that at least 300 types of articles have been carried—ranging from art work and fruit to turtles and yeast. Commodities which have been most frequently carried are newspapers, commercial and legal papers, printed matter, manuscripts, advertising matter, films, miscellaneous merchandise, wearing apparel, fabrics, silks, electric goods, jewelry, furs, photographs, plates, cuts, blueprints, auto parts, hardware, and cut flowers.¹³

Already considerable thought has been given to the carriage of ripened fruits and vegetables from the south to northern markets.¹⁴ Plane-loads of fresh fish packed in dry ice have been carried from Mexico to Brownsville.¹⁵ Day-old chicks which require no food or water during the drying-out period of 36 hours after hatching have been transported in great numbers from hatcheries.¹⁶ Fresh flowers are a constant source of revenue even under present conditions,¹⁷ and as rates are adjusted to lower levels vast movements of goods by air can be expected.

Regional Movements:

Middle West (55.5%)—In a regional study of airline movements of commodities in 1930, it was found that slightly more than 55% of all air express originated in the middle west, principally at Chicago, and followed in turn by Cleveland, Detroit, Moline, Milwaukee, Toledo, Indianapolis, and Cincinnati. Shipments from Chicago consisted largely of papers, checks, films, electric goods and parts, printed matter, miscellaneous merchandise, dresses and cloth-

11. Loc. cit., note 5, p. 559.

12. Loc. cit., note 6.

13. F. Haag, Jr., Op. cit., note 1, p. 4. "Any article that will be carried by domestic railway express can be sent by Pan American Air Express to Mexico, the West Indies, Central and South America. Orchids, plants, baby chicks, and other fragile articles travel constantly over the airways. Machinery parts, merchandise of all types, fashions, minerals, gold, precious stones and other articles are carried every day. There is no article in foreign trade, with the single exception of heavy livestock, which Pan American has not carried": Pan American Airways Express Tariff (effective Aug. 1, 1932).

14. F. Haag, Jr., Op. cit., note 1, p. 11.

15. H. H. Blee, "The Future of Air Express," 27 Aviation 1155 (1929); 1 Air Commerce Bull. 7 (Jan. 2, 1930).

16. M. C. Abrams, "Air Express Possibilities in the United States," 30 Aviation 686 (1931).

17. F. Haag, Jr., Op. cit., note 1, p. 5; R. S. Findley, "Who Ships What by Air Express," 18 U. S. Air Serv. 27 (Jan. 1933).

ing, jewelry, and cuts. Cleveland shipped photographs, copies, checks, hardware, miscellaneous parts, printed matter, merchandise, art work, advertising matter, aeroplane parts, and glass. Detroit was the originating point for air shipments of printed matter, photographs, papers, auto parts, springs, tools, airplane parts, and other miscellaneous parts. From Moline, air express carried auto parts, printed matter, and merchandise; from Milwaukee, castings, films, and merchandise; from Toledo, merchandise and miscellaneous articles; from Cincinnati, merchandise; and from Flint, principally printed matter.

Eastern Seaboard (17.4%)—The greatest part came from New York City and was mainly of an emergency nature, although dress manufacturers were taking an interest in shipping samples to various sections of the country by air.

Pacific Southwest (14.2%)—The movements originated largely at San Francisco, Los Angeles, San Diego, Oakland, and Salt Lake City, but the types of goods carried are not shown.

New England (8.6%)—Most shipments were between New York City and Boston. Northbound shipments between these points exceeded southbound by about 40% and consisted of electrical goods, radio parts, and news service material. From Boston to New York the shipments included electrical goods, radio parts, airplane parts, and shoes.

Pacific Northwest (3.1%)—Shipments consisted of newspapers, auto parts, films, cut flowers, and merchandise. Approximately 95% of the air express handled at Spokane was estimated to have been emergency shipments of small and light packages.¹⁸

The remaining 2.2% originated in the *Southeast*, *Gulf-Southwest*, *Central Northwest*, and *West Mid-Continent* regions.

Coast to Coast:

These lines have carried bank clearances, advertising copy, clothing, legal and mercantile papers, dentists' supplies, store goods for preview sales, jewelry, machinery parts, matrixes, medicines, serums, drugs and surgical instruments, oil-well supplies and replacements, feature and news films, photographs, printing plates, samples, documents and securities, style merchandise, and vegetables and fruits for special occasions. Gardenias are regularly shipped from California to New York.¹⁹

18. *F. Haag, Jr.*, Op. cit., note 1, pp. 6-10.

19. *Ibid.*, pp. 4-5.

What Commodities May be Carried:

It is estimated that at least 50% of railway express consists of dry goods, millinery goods, and men's, women's and children's clothing from the wholesaler to the retailer, and from the retailer to the customer. The remainder is made up principally of ice cream, cut flowers, fresh fruits and vegetables, laundry, newspaper ready print, plate matter for small newspapers, moving picture films, perishable food products (such as berries and small fruit, eggs, fresh fish, oysters, and poultry), milk and cream for domestic consumption, sour cream for butter making purposes, bread, fragile articles (such as cut glass, chinaware, scientific instruments, cameras, valuable paintings, statuary, growing plants, x-ray tubes and machinery), live stock, pet stock, and other live animals of all kinds, newly hatched chicks, money, paper currency, gold, silver and minor coin, securities, drafts, notes, bullion (including sulfides, cyanides, and similar forms of uncoined gold and silver), jewelry, valuable papers, and other articles of unusual value.²⁰

By comparing the list of the foregoing articles with those already carried by air it is evident that, with lower rates and future development, air express may make serious inroads into the railway express business—at least between the larger cities.

III. AIR EXPRESS SERVICE

Area Served by Air Express:

Air express service is directly available to shippers in practically every important city in the United States. The only states which are not served are Maine, New Hampshire, Vermont, and Delaware. Direct connections can be made by day or night from coast to coast, from the south and southwest to the middle west, and to the east and west coasts. The northwest is served by feeder lines connecting with one of the main continental systems. A project is now being considered for the extension of a line from Chicago, Detroit and Milwaukee to provide a through route from the New England and eastern sections to the Pacific northwest.²¹

The average length of individual flights on airlines is about 150 or 200 miles. With the advent of faster equipment this distance may be increased to provide especially fast transcontinental passenger service. It is, of course, to be expected that these planes

20. E. S. Ketchum, *Express and Parcel Post Services* (1918), pp. 53-58.

21. *Chicago Daily Tribune*, Jan. 29, 1933.

will carry a limited amount of express, just as other passenger planes do.

The relatively long distances traversed by airlines on each leg of a journey restricts, to a great degree, the number of purely intrastate services of both passengers and express. It is likely, however, that the air freight lines may make more frequent stops, since their speed will not need to be so high as that required for passenger planes. This will mean a coordination of the air freight service with the air express service to the extent of reaching directly, by air, smaller cities than are now touched by scheduled air operations. At present 30 states have within their borders one or more intrastate air express carrying line.

Federal and State Regulations:

The limited number of the cities served by air express, both in interstate and intrastate commerce, has not yet appeared of sufficient complication or importance to the general public, to necessitate government regulations. Although a few states require intrastate airlines to have certificates of convenience and necessity and the federal government requires certificates of authority for interstate passenger lines, these regulations are mainly for the protection of the travelling public. Restriction of competition has not usually been the object of state requirements, and cannot be the object of the federal rules. Nor has the object been the regulation of rates.²² The only significance to be drawn from these regulations is that cognizance has been taken of commercial air transport operations, and in most cases the orders of state commissions allowing certificates of convenience have included provisions for the intrastate carriage of merchandise as well as passengers.²³

An added feature to air express service, however, which is not

22. *F. D. Fagg, Jr. & A. Fishman*, "Certificates of Convenience for Air Transport," 3 JOURNAL OF AIR LAW 515 (1932); *H. C. Knotts*, "Certificates of Convenience and Necessity for Air Carriers," 3 JOURNAL OF AIR LAW 58 (1932); *T. H. Kennedy*, "The Certificate of Convenience and Necessity Applied to Air Transportation," 1 JOURNAL OF AIR LAW 76 (1930); *M. W. Willebrandt*, "Federal and State Control of Air Carriers by Certificates of Convenience and Necessity," 3 JOURNAL OF AIR LAW 159 (1932); *I. S. Rosenbaum*, "Regulation of Aircraft as Common Carriers," 3 JOURNAL OF AIR LAW 194 (1932); Report of the Standing Committee on Aeronautical Law, 1932, American Bar Association, 1932 U. S. Av. R. 319, 324-329; *Application of Gettysburg Flying Service, Inc.*, 8 Pa. P. S. C. R. 787, P. U. R. 1928 B287, 1932 U. S. Av. R. 181 (1927).

23. *Application of Gettysburg Flying Service, Inc.*, cit. note 22, pp. 181, 183; *Application of Francis A. Riordan et al.*, P. U. R. 1928D 854, 1932 U. S. Av. R. 185 (Nev. 1928); *Application of U. S. Airways, Inc.*, Colo. Pub. Utilities Comm., Oct. 2, 1928 (not officially reported), 1932 U. S. Av. R. 187; *Applications of Century Air Lines, American Airways, Inc., & National Air Transport, Inc.*, Ill. Commerce Comm., Aug. 26, 1931 & Oct. 7, 1931, 1932 U. S. Av. R. 197.

found to the same degree in the case of passenger service is the coordination of railroad express or of bus company express with that of airlines. The Railway Express Agency has exclusive contracts with six airlines covering a large part of the United States for carrying air express. In coordination with this is the entire railway system over which the agency operates. At present, however, rail and air rates are not coordinated, but are added one to the other.

On the other hand, a coordination of bus and air express presents a different problem. A combination arrangement between Transcontinental & Western Air, Inc., and Greyhound Bus Company provides for joint similar rates to all cities within certain specified zones covering a major part of the United States.

It has been questioned, under the Interstate Commerce Act, whether air express is subject to the jurisdiction of the Interstate Commerce Commission. Clearly, the Hepburn Act gives the Commission authority over the Railway Express Agency.²⁴ Does this also give it jurisdiction over *air* express shipments of this company? If it gives this jurisdiction over its air express, then why should not that same authority extend to airlines carrying express in competition with it?

These questions are answered by Commissioner Frank McManamy in a letter as follows:²⁵

"Section 1 (3) of the interstate commerce act defines the term 'common carrier' as used in the act as including express companies, and if this provision stood alone it might be interpreted as broad enough to include all companies conducting an express business whether the means of transportation were by land, water or air; but the provision does not stand alone and must be read in connection with paragraph (1) of section 1 which limits the application of the provisions of the act to common carriers engaged in transportation by certain means, that is, 'transportation of passengers or property wholly by railroad, or partly by railroad and partly by water when both are used under a common control, management, or arrangement for a continuous carriage or shipment' or the 'transportation of oil or other commodity, except water and except natural or artificial gas, by pipe line, or partly, by pipe line and partly by railroad or by water,' or the 'transmission of intelligence by wire or wireless * * * .' It will be observed that transportation by air is not included and it therefore follows that transportation by air either of freight or passengers whether conducted by a carrier also engaged in transportation by railroad or by an express company is not within the provisions of the act."

In addition to this argument it is practically certain that air express

24. 1906.

25. Feb. 16, 1933.

was not contemplated by the authors of the Hepburn Act, which was enacted less than three years after the airplane was invented. More recently the attitude of Congress is expressed in the provision of the Air Commerce Act which is construed to deny to another department of the federal government the power to give exclusive franchises or to regulate beyond the requirements of safety.²⁶

International Carriage and Regulation:

International carriage of air express has not extended in this country in the same complicated manner as in European and other foreign nations. However, our own Pan American Airways, operating from Miami and Brownsville to countries in the Caribbean Sea and Central and South America, carries a considerable amount of express in foreign commerce. Also, American Airways operates from Detroit to Buffalo by way of Ontario, Canada, and from Albany to Montreal, Canada. Gorst Air Transport makes special trips from Seattle to nearby Canadian points, and Gilpin Airlines carries express between San Diego and Agua Caliente, Mexico.

International regulation has not asserted itself very much in the case of the above operations, except as applied to the flying of airplanes in general over the territory of another country, and as applied to customs requirements.²⁷ The Havana Convention affects all of our operations to South and Central America and the West

26. Air Commerce Act, May 20, 1926, Ch. 344, Sec. 5(b), 44 Stat. L. 568; 49 Mason's U. S. C. 176, 1928 U. S. Av. R. 333.

27. Air Commerce Act of 1926, cit. note 26, Sec. 7; *F. E. Lee*, "Legislative History of the Air Commerce Act of 1926," 1929 U. S. Av. R. 117, 153; Aircraft Public Health Regulations of 1928, 1929 U. S. Av. R. 270; Aircraft Customs Regulations of 1929, 1929 U. S. Av. R. 267; U. S. Airport of Entry Regulations, 1931, 1932 U. S. Av. R. 295; Havana Convention (effective Aug. 26, 1931), 1932 U. S. Av. R. 298, 2 Air Commerce Bull. 459 (1931); *S. Latchford*, "Habana Convention on Commercial Aviation," 2 JOURNAL OF AIR LAW 207 (1931); "The Fourth Pan American Commercial Conference," 3 JOURNAL OF AIR LAW 104 (1932); Belgium-United States Air Arrangement, 1932, 4 JOURNAL OF AIR LAW 101 (1933); Canada-United States Air Arrangement, 1929, 1929 U. S. Av. Rev. 273; Columbia-United States Agreement Respecting Air Traffic, 1929, 1929 U. S. Av. R. 271; Germany-U. S. Air Arrangements of 1932, 1932 U. S. Av. R. 317; Air Transport Agreements Between Germany and Czechoslovakia, 3 JOURNAL OF AIR LAW 291 (1932); Italy-U. S. Air Arrangements, 1931, 1932 U. S. Av. R. 331; *S. Latchford*, "Air Navigation Arrangement Between the United States and Italy," 3 JOURNAL OF AIR LAW 75 (1932); Arrangement Between the United States and the Union of South Africa, 1931, 1932 U. S. Av. R. 394, 3 JOURNAL OF AIR LAW 290 (1932); *F. D. Fagg, Jr.*, "The International Air Navigation Conventions and the Commercial Air Navigation Treaties," 2 Southern Cal. Law Rev. 430, 444 (1929); *K. Colegrove*, "The International Aviation Policy of the United States," 2 JOURNAL OF AIR LAW 447 (1931); *B. V. York*, "International Air Law in the American Republics," 3 JOURNAL OF AIR LAW 411, 442 (1932); *J. I. Puente*, "Survey of Commercial Aerial Navigation Law in Latin America," 1 JOURNAL OF AIR LAW 119, 127-131 (1930); Mexican Law of Civil Aeronautics (effective June 30, 1930), Art. 41-79, 2 JOURNAL OF AIR LAW 557, 561-567 (1931). See also: Maryland Statutes, 7 L. 1931, Ch. 403, 1931 U. S. Av. R. 365; *A. W. Knauth*, "Federal Airship Foreign Commerce Bill," 2 JOURNAL OF AIR LAW 202 (1931); *E. A. Poe, Jr.*, "The Proposed Federal Merchant Airship Act and Its Comparison With the Existing Maryland Act," 3 JOURNAL OF AIR LAW 179 (1932); Report of the Standing Committee on Aeronautical Law, 1932, American Bar Assn., loc. cit., note 22, pp. 329-336; *R. W. Fixel*, "The Seadrome and International Law," 2 JOURNAL OF AIR LAW 24 (1931).

Indies, but not to Canadian points, since Canada is not a party to it. Because of this and by reason of company agreements with the nations concerned, shipments via Pan American are found to be made under preferred clearances resulting in no delay due to customs arrangements. On the other hand, air express shipments to Canadian points require that landings be made by scheduled airlines in the same manner as private air carriers at the established airports of entry for customs inspections.²⁸ It is expected that arrangements will soon be made to alleviate this difficulty, but, until then, air express shipments to destinations beyond the airports of entry lose their effectiveness of speed and hence their value to the shippers.

However, it is a principle of international law, based on the idea of national sovereignty over superjacent airspace and recognized by the Havana Convention²⁹ that each nation has the right to say what airlines can operate, and under what conditions, over its territory, regardless of any agreement allowing planes of other countries freedom of flight within its boundaries.

A further element will soon enter into our international regulations and laws when the projected transatlantic and transpacific airlines are opened for operation. Admiralty practices, further international agreements, and private international law will of necessity be included in the problem.³⁰

There have been at least three projected schemes for a transatlantic airline. One has been the operation of airships from the United States to Europe.³¹ The present McNary-Parker Merchant Airship Bill was introduced ostensibly to assist in the promotion of this line.³² A second proposal was to anchor seadromes at intervals of approximately 300 miles and to operate airplanes from New York to Bermuda, the Azores, and hence to the mainland of Europe.³³ A third, and the most recent, has been a plan proposed by a company of high reputation for its efficient operations over

28. Canada-United States Air Arrangement, 1929, Loc. cit., note 27, Art. 6.

29. Cit. note 27, Art. 22.

30. Cf. *B. V. York*, Loc. cit., note 27, pp. 439-440; *A. W. Knauth*, Loc. cit., note 27; Maryland Statutes, cit. note 27; *E. A. Poe, Jr.*, Loc. cit., note 27; Report of the Standing Committee on Aeronautical Law, 1932, American Bar Assn., Loc. cit., note 22, pp. 329-336.

31. *C. L. Lawrence*, "Trans-Ocean Airship Service and Government Support," 5 *Aviation Engineering* 15 (Dec. 1931); *J. S. McDonnell, Jr.*, "Trans-Atlantic Service," 12 *Airway Age* 134 (Feb. 1931); *U. S. Daily*, Jan. 20, 1933.

32. *E. A. Poe, Jr.*, Loc. cit., note 27, p. 181; *C. L. Lawrence*, Loc. cit., note 31, p. 18; *J. S. McDonnell, Jr.*, Loc. cit., note 31, p. 135.

33. *E. Hanson*, "Armstrong Seadrome Project Progresses," 11 *Airway Age* 353 (Mar. 1930); *E. Hanson*, "Legal Aspects of the Seadrome," 11 *Airway Age* 1555 (Dec. 1930); *R. W. Fixel*, Loc. cit., note 27; *C. L. Fitch*, *Chicago Herald & Examiner*, Feb. 18, 1933; *U. S. Daily*, Dec. 15, 1932.

the Caribbean Sea. It has obtained design specifications from two airplane manufacturers of equally high standing and intends to operate huge seaplanes carrying 50 passengers and powered by four motors following the great circle course from the United States through Canada, Greenland, and Iceland to London and possibly other European cities. At the same time, it announced plans for extending another line through Alaska (using its Alaskan airways system as a base) following a great circle course over the Siberian Coast to Japan or China.³⁴ Other optional routes were also proposed.

The problem of connecting these two routes so as to provide an American air route from Europe to the Orient in competition with the international airlines of Europe is being met in the United States principally by Northwest Airways and American Airways. Already the latter's air mail lines extend from Montreal, Boston and New York, through Buffalo, and Cleveland, to Detroit and Chicago.³⁵ In the western part of the country, from Chicago and Milwaukee, Northwest Airways has projected a line through the Twin Cities to Seattle.³⁶ American Airways originally owned the Alaskan airways system before turning it over to Pan American. It may be expected therefore, that the short gap between Seattle and Alaska will be bridged by one or another of the three companies when the transoceanic service is inaugurated.³⁷

This presages an air express service which will extend from Europe to the Orient through the United States involving the varied rules, regulations and treaties of nations adhering to the Common law, Civil law, and Asiatic law, as well as the adaptation of many maritime rules.

Services Offered:

Exclusive of Pan American Airways, which operates entirely internationally, and the Inter-Island Airways, Ltd., of Hawaii, we

34. Pan American Airways, Sikorsky Aviation Corporation, and Glenn L. Martin Company. *Wm. Babson*, "Clipper Ships for America's Merchant Marine of the Air," 18 U. S. Air Services 11 (Jan. 1933); Chicago Daily Tribune, Dec. 2, 1932. Recently application was made to the Reconstruction Finance Corporation for a loan to assist in establishing one of these transoceanic ventures: Chicago Herald & Examiner, Feb. 18, 1933.

35. 4 Official Aviation Guide 21 (Mar. 1933).

36. Chicago Daily Tribune, loc. cit., note 21. Northwest's recent acquisition of control of the Kohler Aviation Corporation gives it a direct run from the Pacific Northwest through Milwaukee to Detroit: see Chicago Journal of Commerce, Mar. 2, 1933.

37. This route has been operated seasonally by Alaska-Washington Airways. See *R. Hayes*, "Alaska-Washington—the Short Season Makes the Most Efficient Management of Planes and Personnel Necessary," 12 Airway Age 40 (July 4, 1931).

now have at least sixteen companies which advertise that they will carry air express.

Three companies, American Airways, Transcontinental and Western Air, and United Airlines, operate from coast to coast. Northwest Airways connects the northwest with Chicago, and United Airlines connects this city with the southwest. American Airways controls most of the traffic in New England and the Mississippi valley and Gulf regions. Eastern Air Transport operates along the Atlantic coast from New York to Miami and inland as far as Nashville, Tennessee. United Airlines covers the Pacific coast from Seattle to San Diego and shares the express traffic with Varney Air Services and Transcontinental and Western Air between San Francisco and Los Angeles. Western Air Express serves a great deal of the Rocky Mountain territory and the Pacific southwest. Other companies provide feeder services to these main airlines. The above express carrying lines fly over a total of approximately 27,058 miles in the United States every day, on about 95 schedules.³⁸

At present, the bulk of air express is carried by day and a minor portion by night. This results from its dependence on passenger schedules and detracts from its competitive effectiveness with railroads over distances which can be covered over-night by trains. However, a few schedules carry mail at night and several lines are now operating passenger planes during the hours of darkness.³⁹ The carriage of passengers at night has been delayed because all of the nation's airways have not yet been equipped for night flying.⁴⁰

However, coast to coast night service is now available for passengers, mail and express on all three transcontinental systems. Also the southwest and northwest are connected to Chicago with night schedules. The fast service afforded by the Air Express Company Lockheed planes from Los Angeles to New York in 17 hours is also accomplished partly at night.⁴¹ Transcontinental and Western Air, Inc., contemplates a similar service in 15 hours within a short while. The present fastest passenger schedule from coast to coast is about 24 hours.

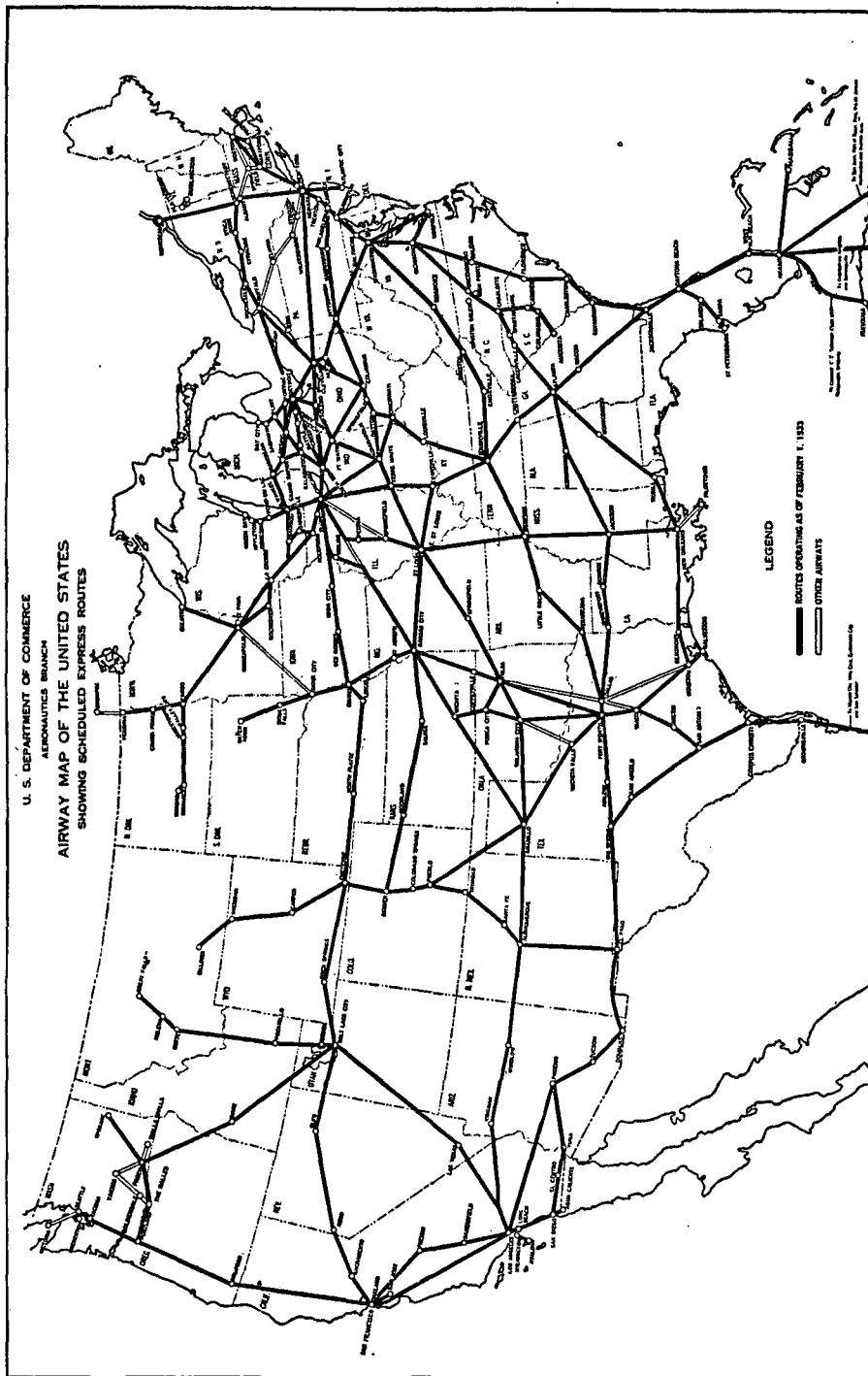
In the light of present events, the passenger lines are on the verge of a war for speed. United Airlines has for some time advertised a new two-motored ten passenger, express and mail

38. 4 Air Commerce Bull. 381 (1933).

39. See Official Aviation Guide, Mar. 1933.

40. See map in 4 Air Commerce Bull. 394 (1933).

41. *R. S. Findley*, Loc. cit., note 17.



Photostat furnished by The Department of Commerce, Aeronautics Branch.

plane capable of cruising 155 miles per hour. Transcontinental and Western Air has ordered a Northrup single motored ship of about the same capacity and a cruising speed of 187 miles per hour. This company also expects to use a two-motored Douglas plane capable of about the same speed as the Northrup and of slightly greater capacity. Both of the latter types are equipped with wing flaps and slots which increase their speed effectiveness by enabling them to attain a reasonable landing speed.

Obviously, such high speeds can find nothing on the ground to compete with them. The greater the distance, the more effective this difference becomes. For example, the fastest train service from Chicago to New York City is 18 hours, whereas planes regularly make the trip in six and a half hours and will, within the year, traverse the distance in only four and a half hours. This means that orders can be placed in New York shortly before noon and shipments received in Chicago before the close of business hours on the same day. For shorter distances in the daytime air shipments will be of superior value to ground carriage.

The practical effect of this high speed factor is found in present business conditions. A small stock of goods on hand is necessitated today for merchants and others, so that loss will be minimized or eliminated in the event of a sudden change in styles, particularly in women's clothes and shoes, or a change in economic conditions. Likewise, business men are now compelled to operate on a smaller capital investment and a correspondingly lower stock on hand. The advisability of smaller inventories to obviate oppressive taxation is manifest. It has been estimated by automobile and truck manufacturers that a saving may be effected by the use of air express for carrying spare parts, since it would enable them to eliminate a portion of a huge inventory. One truck company estimated that if a proper air express service were available and the costs were no more than three times those of first class railway express, they could ship by air 60,000 pounds of parts per day to nine distributing points with an estimated inventory of \$5,000,000 as compared with the present inventory of \$15,000,000 and thirty-two distributing points, in order to provide 24 hours service anywhere in the United States.⁴²

Another automobile company estimated that 11% of its current railway express shipments could go profitably by air at the rate of three times first class railway express rates. Individual packages weighed about fifty pounds and the average distance was

42. *M. C. Abrams*, *Loc. cit.*, note 16.

750 miles. It was estimated that this enabled automobile repairs to be made one or two days sooner than when shipments go by railway express.⁴³

Inventory costs can be reduced by shipping wheat samples by air instead of by railroad express as at present.⁴⁴ Every inventory reduction means a tax reduction and tax reduction is the demand of every business.

Also, air express can be used to advantage by manufacturers or producers of perishable articles by increasing the territorial radius in which sales can be made, and it can develop new markets for such luxury foods throughout the year as frozen foods, fresh fruits, vegetables and sea foods not now available in some communities.

The chief drawback at present to all airlines operations is the undependability of service. Passenger service is continually being disrupted by unflyable weather conditions. Mail service is not, of course, hindered to the same extent, since the same regulations are not in force, nor is the safety factor to be considered as having as much weight. Detailed figures are not available as to the percentage of mail flights delayed or cancelled because of bad weather conditions, but it is believed to average about 7% throughout the year. During winter and spring, cancellations and delays are more frequent than in the summer months. Also, over a long journey, such as from coast to coast, the weather may be good in one part but not in another and hence add further undependability. Air express can move through any kind of weather through which mail can be carried. This is so, of course, where express and mail are carried together. However, where air freight or express is carried without mail there is likely to be a lower percentage of completed schedules. The operator will in such cases give greater consideration to the safety of his cargo and planes. Express cargo pays him less than does mail and he cannot afford to risk possible liability for any uninsured shipments, even though such liability is limited. Also the planes which will be used for air freight are not constructed so as to make them easy to control under very bad weather conditions. Their size and value will make the operator think well before he sends them out under conditions which make mail flying dangerous.

However, there is every reason to believe that within from

43. *Ibid.*

44. *Ibid.*

two to five years this lack of dependability on the part of the air express carriers, as well as of passenger and mail carriers, will be a thing of the past. Partially successful efforts have already been made to enable planes to land by means of radio when the pilot cannot see outside of his cockpit.⁴⁵ It is already possible and feasible to fly through almost any kind of weather. When it becomes equally feasible to land and take off under such conditions it is believed that airline operations will prove to be more dependable than the operations of any other existing form of transportation. This improvement in safety will naturally enhance the profits in connection with air express by decreasing the loss ratio. Operators of air express will automatically be charged with the liability of insurers of the safe carriage and delivery of goods consigned to their care, and each landing, safely made, will relieve them of this loss burden. As the profits are thereby increased the rates may be correspondingly lowered.

Military Air Freight Carriage:

The Army Air Corps, which has so often in the past paved the way for subsequent commercial aviation enterprises, again gives the airlines a lesson in the carriage of goods. Since the early part of 1932 the Air Corps has operated a regular air transportation service for carrying supplies between four depots and the fields surrounding them. During 1932, 1,003,578 pounds were carried. The shipments consisted mostly of complete airplane engines, airplane and engine parts and accessories, paints, dopes, oils, photographic supplies and equipment, armament supplies and equipment, clothing, cordage, fabric, small and hand tools, lumber, metal and composition material, chemicals, office and school supplies and aircraft and commercial hardware.⁴⁶ The effect of this service is expressed in the following paragraph from the 1932 Annual Report, Chief of the Air Corps:

"An air transport supply service operating on regular schedule has been established at the Fairfield, Middletown, Rockwell, and San Antonio Air Depots. Up to April 30, 1932, this service had transported over 120 tons of freight at a saving of \$8,000.00 over the cost of packing and transporting by rail. The service operates to reduce the quantity of stock required to be carried at the activities served."⁴⁷

45. See Chicago Sunday Tribune, Feb. 26, 1933.

46. Cft. note 8.

47. Par. 5r, p. 80. Quoted with the permission of office of Chief of the Air Corps. The \$8,000 saving combines those of the four depots from Jan. 11, 1932 to Apr. 30, 1932, and does not include costs for overhead such as terminal facilities which a commercial concern would have to account for, but which is already maintained for other army purposes.

Equipment: Types of Aircraft:

Almost every kind of plane now used on airlines is also available for carrying express. There are no standards in equipment, capacities, or storage places for goods. In fact, many airplanes now used for carrying passengers were not designed particularly for airlines, but were produced during the boom period of industry for sale to the general public. This condition is changing with the almost total absence of a general market so that now planes are being designed to comply with the airline operators' requirements, which are generally for the carriage of passengers and mail.

A few of the planes used principally for the carriage of air express both with and without passengers are listed as follows with accompanying details:⁴⁸

<i>Type of Plane</i>	<i>Total Pay Load</i>	<i>Total Express Load</i>	<i>Cruising Speed</i>	<i>Number Passengers</i>
Bellanca (Army A.C.-C-27)	2,140	2,140	...	0
Boeing 95	1,450	400	105	0
Boeing 40-B-4	1,421	600	105	4
Flamingo	1,275	200	110	6
Fokker (Army A.C.-C-14)	1,500	1,500	110	0
Fokker F-10	2,000	500	120	10
Fokker (Super-Universal)	1,400	300	100	6
Ford Trimotor	4,980	100	125	13
Ford Freight Carrier	3,000	3,000	...	0
Hamilton	2,500	100	110	6
Lockheed Orion	1,172	152	180	6
Pilgrim	2,100	No set amount	105	9
Sikorsky Amphibian	1,000	200	90	4
Travel Air	1,000	200	105	5

As shown in the foregoing chart a relatively small percentage of the pay-loads of passenger planes is made available for carrying express. As yet, except in the case of the Ford Motor Company private freight lines, and the recently inaugurated Air Express Company, operating between Los Angeles and New York, very little use has been found for large planes equipped to carry only express. It is true, however, that smaller planes, such as the Boeing and the Stearman mail planes designed to carry only mail, are available for the carriage of express also. The drawback to the use of these planes is that they carry small payloads as compared to the operating cost. Air Express rates must be low, whereas these planes were designed to operate at a profit carrying

48. These figures are approximate and representative only, and capacities vary according to what companies use the planes. Often no space is reserved for express if mail, passengers and baggage will fill the plane.

a very lucrative cargo—mail. It will, accordingly, be desirable to have larger planes for carrying express alone, where the unit charge will be low.⁴⁹

Equipment: Stowage Facilities:

From the liability as well as from the operating viewpoint, the methods and places of stowing express shipments in planes present a problem. In the event of a crash, there is greater possibility that goods will be damaged if stowed in the bow of a plane than if placed in the stern. Also, perishable goods may be injured by heat if put too close to the motor of the plane.

There is a great variety of methods and stowage spaces on planes used at present for carrying express. The Lockheed Orion has a baggage space aft of the passenger seats used for express; the Lockheed Vega is sometimes equipped with a baggage or mail compartment in the place of one of the front seats just to the rear of the pilot, and it also has a wing compartment and another baggage space in the rear of the passenger seats; the Sikorsky Amphibian has a baggage compartment in its bow; the Travel Air has a compartment in the rear of the passenger section; the Pilgrim has baggage compartments in the bottom part of the fuselage and also between the pilot and the front of the passenger compartment; and some Ford Trimotors have compartments opening from beneath both wings. In most cases any space available in a plane would be used, if necessary, to carry express shipments offered. This includes cabin space not occupied by passengers.

Where planes have been designed exclusively for carrying freight, the inside of the shell has been stripped to its barest essentials to allow for a greater pay-load.⁵⁰ In some planes of this type, the pilot cockpit is open and is placed near the tail of the ship. In others it is either open or enclosed and is located as in the case of most passenger planes near the nose of the plane. Most strictly mail planes are of the former type.

The demand for fast service and the consequent need for avoiding delay at terminals is leading designers and operators to believe that express planes must, in the future, be built with removable containers which can be shifted easily and quickly from small trucks to planes and vice versa.⁵¹

49. Cf. H. H. Blee, *Loc. cit.*, note 15.

50. "Freight Carrier," 31 *Aviation* 222 (1932).

51. H. S. Knerr, "Freeing the Air Forces of their Ground Fetters," 6 *Aviation Engineering* 15-18 (July 1932); "An Idea for the Facilitation of Airplane Cargo," 7 *Aviation Engineering* 22 (1933). Some companies stow their express shipments in metal-lined mail compartments, asbestos pouches, small trunk lockers, or in cloth or mesh bags.

The Air Corps has experimented with several transport planes in an endeavor to determine the most efficient method for loading cargoes. At first, Fokker monoplanes were used. They carried 1,500 pounds, and freight could be loaded through a door located in the under side of the fuselage. A chain hoist was necessary to raise unusually heavy articles such as airplane engines into the cabin. Recently, however, a new type of transport plane has been developed. It is a Bellanca monoplane, and has a carrying capacity of 2,140 pounds. It is provided with a side door for loading freight. The chain hoist is eliminated by towing the engine on a dolly to the plane and loading it into the freight compartment by means of a grooved track running from the compartment to the ground. The track remains in the plane for use when the cargo is unloaded. All freight is securely lashed down to avoid the possibility of it shifting during flight.⁵²

The present haphazard method of storing goods in planes naturally demands that they be packed and wrapped sufficiently to insure safe carriage under the circumstances. However, a distinctly airport to airport service would not require the same crating or packing as would be required on ground carriers, since the shipment would not be subject to such rough handling. Also, with the use of containers, the rough handling element is reduced where pick-ups and deliveries or carriage to centrally located warehouses by truck is concerned. This means lower weights per shipment in many instances and a consequent lowering of air transportation costs to the shipper.

Performance: Schedules:

Under present conditions movements of air express shipments depend almost entirely on the demands of passenger traffic and, to a considerable degree, the schedules required for the carriage of air mail. These are largely linked together through the requirements of the Watres Act⁵³ designed to promote the carriage of passengers by air by providing for their transportation in the same planes which carry the mail. There are, however, a few schedules, particularly at night, which are operated for the carriage of mail only. Any of these schedules are made available for air express.

Passenger schedules are always subject to experiment and change. Each airline attempts to arrange these so as to attract the

^{52.} Cft. note 8.

^{53.} Act of Apr. 29, 1930, Public-No. 178—71st Congress, 1930 U. S. Av. R. 305-307.

greatest possible number of passengers for its own line. Connections with other airlines or different forms of transportation are of secondary importance. Some airlines depend entirely on the passenger traffic for their revenue. Most of the others carry mail. Just a few years ago this was considered the only practicable revenue source. Recently every effort has been extended by airlines, first in competition with railroads and second in open rivalry with one another, to entice the patronage of the travelling public, by solicitation, advertising, and by offering services at reduced fares.

Air mail schedules are arranged for the efficiency of the entire Post Office system. These are naturally more adapted to an air express service, but they still do not provide the most desirable services. It is generally considered that air express requires an extensive and, as nearly as possible, a nation-wide service in order to attract the desired volume of business.⁵⁴ This makes necessary schedules which are not only adapted to the needs of the shipping public but which are coordinated to provide good connections between airlines, facilitating the fast movement for which airlines are patronized.

Performance: Aircraft Maintenance:

Air express, which is considered of almost no importance in the preparation of schedules, is again subjected to other demands, when the problem of maintenance is considered. Inspection, repair and overhaul work is not available at every terminal, but only at certain ones where the necessary equipment and personnel are kept. The planes must not only be flown as nearly as possible in accordance with the demands of traffic, but they must arrive at certain prescribed times at the maintenance bases, and the proper number of hours must have been flown in the meantime in order to get full value out of planes before their use is discontinued on account of obsolescence.⁵⁵

The types of equipment used have a great deal to do with maintenance requirements. Thus, at present, in addition to daily inspections and routine maintenance such as greasing, oiling, gas-sing, cleaning, checking fittings, controls, gasculator screens, radio, lights, battery and generator, and making minor repairs, it is generally considered good practice to conduct checks or examinations of motors every thirty hours. This means testing, cleaning or

⁵⁴ *M. C. Abrams*, Loc. cit., note 2.

⁵⁵ Airplane designs have changed so rapidly in the past that an airplane has seldom been usable as modern equipment for longer than three to five years after production. Recent high-speed planes designed for airline use and equipped with air-brakes and slots accentuate this condition at present.

changing spark plugs, checking distributor breaker points, cleaning carburetor screens, checking valves, instruments, and many other parts, besides making necessary repairs. Usually this is accomplished in a few hours. After every 100 hours in the air, the plane and power plant are given a thorough inspection. And the Department of Commerce conducts a comprehensive examination semi-annually as prerequisite to licensing the aircraft.⁵⁶ There is also the problem of motor overhauls. Usually, after 300 hours in the air a motor is taken from the plane and replaced by another overhauled or new motor. This operation requires several hours or sometimes a day or two, depending on the number and types of motors. Naturally, a motor overhaul requires special workshop facilities, which may be located at only one point on an airline's system. There is further the matter of etching metal propellers periodically in searching for breaks or cracks. They must be replaced by new ones when the blades are cracked or have become worn so thin as to be likely to break while in the air or to "flutter." The airplane itself does not require much attention except to be kept thoroughly clean, to have all fittings and controls inspected, to have all exposed surfaces painted, doped or otherwise protected, and to have the wings and fuselage recovered occasionally. This will depend on the type of covering, whether metal, plywood or cloth. In the case of planes not used to carry passengers, the interiors require very little maintenance, since they are usually stripped of all upholstery, leaving only a shell with the barest essentials as equipment. Improvements are constantly being made in construction and shop practices so that maintenance may cease to be as predominating a factor as at present. Motors will run longer before needing overhauling, and various other parts will stand up better and longer under operating conditions.

IV. AIR EXPRESS ORGANIZATION AND OPERATION

Existing Companies and Methods Used:

(1) *Railway Express Agency*—The first regular air express service of importance in this country was started September 1, 1927, by the Railway Express Agency in conjunction with four companies. National Air Transport, Inc., operated from New York to Chicago, and from Chicago to Dallas; Boeing Air Transport, Inc., from Chicago to San Francisco; Colonial Air Trans-

⁵⁶ Air Commerce Regulations, effective as amended Jan. 1, 1932, *Aeronautics Bull. No. 7*, Aero. Branch, Dept. of Commerce, pp. 8, 9.

port, Inc., from Boston to New York; and Western Air Express, Inc., from Salt Lake City to Los Angeles. The air express mileage operated daily by these companies totaled about 4,000.⁵⁷

During several years thereafter the Railway Express Agency contracted with most of the major airlines throughout the country for the handling of air express. At present they are contract agents for United Airlines, Northwest Airways, National Parks Airways, Western Air Express, Kohler Aviation Corporation, and Rapid Air Transport. These lines provide coast to coast, northwest, southwest, Pacific coast, Pacific northwest, and Pacific southwest services. This agency also represents and provides pick-up and delivery services for Pan American Airways express in this country.

Air express is given special treatment by the Railway Express Agency. Special trucks are used to gather up air shipments immediately upon call. These shipments are taken to a designated centrally located warehouse from which they are taken, just prior to plane departures, to the airport and placed aboard planes. In some cities this latter ground carriage is performed by the air carrier and in others by the express company, depending on local conditions. After the arrival of planes immediate deliveries are made.

When the express company accepts a package it collects the charges, if prepaid, and gives the shipper a receipt, labels the shipment and enters it on the copies of the manifest. A separate manifest is made for each destination and a copy is prepared for each carrier which handles the shipment. Spaces on the manifest allow for each company to receipt it when accepting it from another carrier. Deliveries are made either prepaid or C. O. D. In case of C. O. D. shipments charges are collected and remitted to the express company. Parts of all waybills must be signed by the shipper, company agent, and the consignee. The regulation colors of yellow for prepaid and white for collect shipments are used on waybills and labels.

Routing of shipments is usually arranged by the express agency.

57. *Aircraft Year Book*, 1928, pp. 75-76. "Among the primary reasons for the organization of National Air Transport, Inc., was the operation of an express service between New York and Chicago. With this end in view a number of conferences were held during the early days of its organization in which Robert E. M. Cowie, president of the American Railway Express Company, and Daniel M. Shaeffer, manager of Mail and Express Traffic, the Pennsylvania Lines, participated. The conferences were primarily for the purposes of arranging a contract for the carriage of express by air whereby the American Railway Express would supply solicitation, pickup and delivery service for the common carrier by air": *Aircraft Year Book*, 1927, p. 33.

(2) *Airlines Express*—Several companies, however, handled their own air express. Many of these contracted with Western Union Telegraph Company or with Postal Telegraph Company to provide the pick-up and delivery service. In this way they were free to formulate their own charges and merely add to them those of the telegraph company. At least one airline had not only an arrangement with a telegraph company, but also with a bus company for off-line service.⁵⁸

Most of these airlines depend mainly upon local shipments and are consequently not concerned with a great amount of detail in handling them. Many of them do not even have to worry particularly about bookkeeping or interline routing. Both Western Union and Postal Telegraph have provided these services as well as those of making pick-ups and deliveries. The only thing left for the airline is to take the shipments from airport to airport in whatever equipment is available. Some airlines have utilized local trucking companies for making pick-ups and deliveries and collecting charges. Still others, such as Varney Air Service, Inc., provide their own pick-up and delivery services, dealing with the public directly.

The Century Air Lines express service in particular, during the few short months of its existence in the spring of 1932, provided its own pick-ups and deliveries using small trucks. Also, it established a well-organized traffic solicitation force. Its efforts are said to have indicated considerable profit within a short time.

(3) *General Air Express*—The culmination of these earlier experiments is found in the present organization known as General Air Express. It utilizes the traffic and operating methods of the Century Air Express system together with the operation methods of, notably, Transcontinental and Western Air, and the pick-up and delivery facilities of the Postal Telegraph Company. General Air Express (hereafter termed "G. A. E.") began operations on August 1, 1932. Originally it was composed of seven airlines and Postal Telegraph Company, which number, by reason of mergers among lines in the group, is now five: American Airways, Eastern Air Transport, Transcontinental and Western Air, Pennsylvania Airlines, and United States Airways.

G. A. E. is not incorporated. It is, rather, an interline organization, the functional body being a committee composed of representatives of the member companies, with a chairman occupying the position held by a president in a corporation. A smaller ex-

58. Transcontinental and Western Air-Greyhound Bus Company.

ecutive committee decides upon matters of regulations, and operating details for the entire system.

The larger lines of this group employ managers particularly charged with developing the express business for the company. This is not usually true of smaller lines nor of other larger companies. They generally assign air express duties to personnel principally concerned with other matters. The specialized organization for handling air express apparent in G. A. E., however, does not extend much beyond a small traffic group either in the companies themselves or the interline system. Aside from the committees mentioned the only persons working directly under the head of G. A. E. are express traffic solicitors or salesmen organized in groups in the cities served. New York City has the outstanding example of this development at present. The company express manager is a traffic man. His primary duty is to develop business and to supervise handling it.

The actual handling of shipments by G.A.E. is accomplished by Postal Telegraph Company in the pick-up and delivery end and by regular operations personnel on the part of the airlines.

Uniform shipping papers are used throughout the system. The procedure, briefly, is for a Postal Telegraph messenger (with or without a conveyance for carrying packages) to call at the address of the shipper, if pick-up services are requested. The shipment is taken thence to either a concentration point or airport (depending on the locality) and turned over to an airline representative who prepares the routing instructions. When it is accepted from the shipper his signature and that of the company agent are placed on the waybill. When a delivery is made the consignee's signature is also obtained. Copies of the waybill containing all of the above signatures are finally sent to the accounting department of the originating airline to be filed as evidence against possible claims. Deliveries are made by Postal Telegraph Company without extra charge within the free telegraph delivery area of the cities served. When the consignee is located outside this area, notice is given him by telephone or by other means as quickly as possible. Where delivery cannot be made or the consignee refuses to accept, written notice is immediately sent to the consignee, consignor, and originating airline.

Routing of each shipment is listed on the waybill and also on the cargo manifest. A separate manifest is made for every airline destination, and each waybill number, whether prepaid or collect, and name of consignee is entered on it. A copy of the manifest

is made for each airline (different colored paper indicating each airline) which is to handle it and as each receives it from another company it receipts the latter's copy, showing the time and date thereof. When a single interline shipment will pass over two or more sections of one airline a separate manifest copy is made for each section. Actual times of arrivals and departures are placed opposite the routings listed on the manifest.

In making up routing instructions consideration is given primarily to the speed in effecting deliveries. However, where night schedules are involved it is not considered practicable to make deliveries earlier than 8:00 A. M., although earlier deliveries will be made and routings will follow any specific instructions given by the shipper.

Shipments destined to off-line points beyond the airline terminal are delivered to the Railway Express Agency or any other dependable and equally fast transportation agency. In this case the latter signs the waybill in place of the consignee and re-forwards the shipment to destination.

Under present conditions of relative undependability of airline schedules due to bad weather conditions, it is inevitable that cancellations will occur which will necessitate the air express shipment being forwarded by other means. G.A.E. provides against this contingency by sending the shipment by railway express, or other means, to the destination—or the closest airline point from which the air passage can be continued. The same procedure is followed in the event of a forced landing. Such shipments are forwarded to the "Airgent" of Postal Telegraph Company in the town of destination, who is given notice by telegraph of the impending arrival of the shipment. Where deliveries are to be made to the consignee at such points, Postal Telegraph takes the shipment from the Railway Express Agency and accomplishes the delivery in the regular manner.

The handling methods devised by the Railway Express Agency and General Air Express are considerably more developed than are those of most other domestic express carriers.

(4) *Pan American Airways*—Pan American Airways, in the international field, has shown much progress in the air express business. It began carrying express in Mexico in July, 1929, and has since extended the service to cover its entire system. It advertises not only at the points served, but in cities throughout the United States, and it has agents in principal cities for accepting and forwarding shipments. Chief among these is the Railway

Express Agency which forwards shipments to the Pan American terminals in Brownsville and Miami, and also provides pick-up and delivery services. Agents at all points in the United States are equipped with the necessary papers so that they can deal directly with shippers, and delay can be avoided at Miami or Brownsville when the shipments are transferred to the Pan American planes. Pan American uses a special waybill adapted to the demands of international traffic. It is made in seven copies including an original, each copy being of a different color. Two copies are for customs, one for the departure station, one for that of destination, one for the shipper, one for the consignee, and one for the company.

Terminal Facilities:

In keeping with their lack of a specialized department or equipment for handling air express, the airlines have not yet provided adequate terminal facilities. Those which operate in conjunction with the Railway Express Agency can take advantage of the warehouse terminals already established. However, these are located near the centers of cities, and not at the airports where they are often badly needed and where they will be indispensable as the volume of traffic grows. A project is afoot for an airport warehouse terminal at Newark, New Jersey, and it is expected that centrally located warehouses will soon be established to handle G.A.E. traffic.

A purely airport-to-airport freight service was operated from New York to St. Louis by Transcontinental and Western Air during several months prior to the organization of G.A.E.⁵⁹ However, none other than office and hangar facilities were used for storage. The same is true of other lines which provide such service only occasionally.

Loading and unloading is accomplished with facilities used for air mail. At some airports express, mail, and passengers are loaded and unloaded at the passenger terminals. At others the loading and unloading is taken care of at the hangars. Most shipments consist of small packages and each plane does not carry an exceedingly great number of them. Consequently, the serious need for warehouse terminals has not yet made itself felt.

Handling Facilities:

The handling facilities for air express are so intermingled with those for carrying mail and passengers that it is impossible

59. Cit. note 3.

to consider any of the operating features without also considering the needs and requirements of passengers and mail traffic. We have already pointed out how these factors have influenced schedules and types of equipment. The influence is felt in the actual flying operation, but economic and safety principles are not always the same in each of the three types of air express carriage: express with passengers, express with mail, and express alone.

The first and last main steps in carrying a cargo of express by air before loading and discharge involve several details besides simply taking off and landing the plane. Prior to take-off the pilot must be provided with a weather report, flight clearance, and cargo manifest. Immediately after the take-off, notice of the departure is transmitted to points of destination and sometimes to intermediate places. These messages contain information as to destinations, the number of the plane, name of the pilot, cargo and time departed. Upon arrival at each destination, similar messages are sent to the station of departure. They are transmitted by radio on most of the larger lines, by telegraph, and by use of the Department of Commerce Teletype Weather Reporting System. The latter are called PX (position report) messages.⁶⁰

During the time the pilot has control of the plane in the air he is usually considered to be in complete command of it and the cargo. However, the extent of his authority to act, except in cases of immediate emergency, depends upon the policy of the individual airline. On most lines he can be reached through a radio receiving set on the plane. On many planes transmitting radio equipment permits him to carry on direct telephonic conversations with his own ground stations.

Navigational Facilities: Federal Aid:

The take-off and the landing are merely the evidence of the initial step and the successful completion of a coordination of flying skill and the utilization of navigation aids enroute in quite often a real combat with the elements of weather and darkness.

The principal reason for the establishment of air navigation facilities by the Department of Commerce under the Air Commerce Act,⁶¹ is to provide greater safety in airline operation.⁶²

60. General Airway Information, Airways Bull. No. 1, pp. 132-134 (Sept. 1, 1932), Aero. Branch, Dept. of Commerce.

61. *Cit.* note 26.

62. Viewing these navigation aids as safety precautions, we first consider the principal causes for accidents which have occurred on airlines. Recent statistics cover the first six months in 1932. ("Accident Report on Scheduled Air Transport Operations for the First Six Months of 1932," 4 Air Commerce Bull. No. 5, p. 112, Sept. 1, 1932.) They indicate that of 67 accidents ap-

Other reasons are to enable the airlines to provide a greater variety of services and greater dependability thereof, and to augment the national defense.

Most of the air routes in the United States are marked with raised directional arrows placed ten or fifteen miles apart.⁶³ and painted with the international colors of orange on a white background.⁶⁴ Every 30 to 50 miles an emergency or auxiliary landing field is located and is also appropriately marked.⁶⁵ At night these locations are shown by beacon lights revolving about six times per minute. Every group of ten beacon lights is numbered in sequence from one to ten and a different code is flashed by the clear beacon light for each of the ten beacons. Thus, it is only necessary for the pilot to know what group he is flying over to know his location. As each beacon rotates, a red or green blinker light which indicates the direction of the course is seen between the clear flashes. Red flashes are used where there are no landing fields, and green flashes where a landing field is available. A third type is the landmark beacon which serves as an aid to navigation. It is red and, if revolving, turns at the rate of two

proximately 11% resulted from some personal error of the pilot, 22% from motor failure, 19% from structural failure, 14% from bad airport terrain conditions, 32% from weather, and about 2% was because of darkness.

The pilot error was lower than during any previous similar period. (Civil Aircraft Accidents and Casualties, Aero. Bull. No. 13, pp. 14-16, July 1, 1932.) This indicates greater experience among airline pilots and closer supervision by the airlines. There will always be the human element to consider in accident cases, whether on ground or water or in the air, but the percentage of these occurrences is being reduced.

Motor failure can, in many cases, be directly traced to faulty maintenance on the ground or to improper treatment of the motors in the air. Future developments in motor designs, and greater efficiency in maintenance will eventually almost eliminate motor failure as a reason for airplane accidents on airlines.

For the same reasons we may expect structural failures—which include control failures—to be practically eliminated.

Bad airport conditions can be improved by stricter supervision and the clear marking of surrounding obstructions. When their importance to the public generally is more fully realized, this condition will not interfere with airline operation. Bad terrain conditions can be avoided by greater frequency of airports, particularly by the establishment of "landing strips" (merely a field of proper dimensions suitably indicated as being safe for landing in an emergency) along the air routes, such as are planned by the state aeronautics commission for use in Illinois. Also the recent innovation of wing flaps, or a double opening rudder device, used to slow up high speed ships in landing and to decrease their angles of glide and take-off will make such conditions less hazardous.

Weather conditions accounted for 32% of the accidents in the period named. During this time there were any number of scheduled flights which were cancelled because of unflyable weather—rain, mist, snow, fog, freezing, etc. Most of our navigation facilities are established to help combat this mutual foe of all means of transportation.

The approximate 2% of accidents caused by darkness can be alleviated by the same means used to combat bad weather conditions.

63. "Aeronautical Beacon Lights," 3 Air Commerce Bull. 361 (1932).

64. "New Color Combination and Metal Directional Arrow Adopted for Airways Beacon Lights," 3 Air Commerce Bull. 440 (1932).

65. Loc. cit. note 63, p. 361: "Marked Auxiliary Landing Fields," 3 Air Commerce Bull. 60 (1931); "Intermediate Landing Field Personnel Render Important Service to Airmen," 3 Air Commerce Bull. 55 (1931); "Use of Department of Commerce Intermediate Landing Fields Increased in 1930," 2 Air Commerce Bull. 465 (1931).

turns per minute, or six turns where it marks a hazardous area.⁶⁶ Symbols denoting these various markings are printed on maps used by the pilots.⁶⁷

These facilities are supplemented by radio devices which enable a pilot to fly when conditions of visibility are such that he cannot see the markers or beacons. Radio range beacons have been established along the principal air routes at intervals of approximately 200 miles. Each beacon has an effective range of about 100 miles. Radio range beacons of the aural type transmit two signals broken intermittently by station identification signals. These two signals are the letters "A," indicated by dot-dash, in international radio sound code, and "N," dash-dot, and are heard by the pilot through his ear-phones. Along the line of the proper course between stations these signals merge into a steady hum or dash. If the pilot should fly to one side of his course one signal will predominate to a certain degree over the strength of the other. Usually, when off the course as much as 30 degrees only one signal is heard. Fixed rules indicate the side on which either signal is transmitted.⁶⁸

A visual type radio range beacon operates in much the same manner, except that its signals are transmitted on certain radio frequencies,⁶⁹ which vibrate two reeds contained in a receiving instrument on the instrument board of the plane.⁷⁰

In flying the radio ranges pilots have been cautioned to fly to the right of the courses to avoid the possibility of running into planes approaching from the other direction.⁷¹ This presents a

66. Loc. cit. note 63, pp. 361-365: "Color Characteristics and Operation of Private Aeronautical Lights Located at Airports," 4 Air Commerce Bull. 49 (1932). See also: "Instrument to Turn on Airway Lights at Nightfall and on Dark Days Developed by Aeronautics Board," 3 Air Commerce Bull. 413 (1932).

67. Loc. cit. note 63, pp. 361, 364-365. See also: "Sectional Airway Maps of the United States," 2 Air Commerce Bull. 357 (1931).

68. General Airway Information, op. cit. note 60, pp. 77-84: "Flying the Radio Ranges," 4 Air Commerce Bull. 135 (1932); "Radio and the Nation's Airways," 1 Air Commerce Bull. 1 (Nov. 15, 1929); "Aircraft Radio Development," 1 Air Commerce Bull. 5 (Aug. 15, 1929); "Radio Range Beacon Service Now Available on Entire Transcontinental Airway between San Francisco and New York," 2 Air Commerce Bull. 437 (1931).

69. 65 and 86%, and 75 and 100 cycles: "Flying the Radio Ranges," loc. cit. note 68, p. 139.

70. General Airway Information, op. cit. note 60, p. 84: "Flying the Radio Ranges," loc. cit. note 68, pp. 139-140; "Radio and the Nation's Airways," loc. cit. note 68; "Aircraft Radio Development," loc. cit. note 68; "Status of Visual Type Radio Beacon," 1 Air Commerce Bull. 19 (Jan. 2, 1930); "Visual Radio Range Beacon Installed at Bellefonte, Pa., for Service Trials on Cleveland-New York Airway," 2 Air Commerce Bull. 179 (1930); "Los Angeles-Kansas City Airways to be Equipped with Visual Radio Range Beacon Service," 2 Air Commerce Bull. 584 (1931); "Pointer-Type Course Indicator for Use with Visual Type Radio Range Beacon Developed," 2 Air Commerce Bull. 526 (1931); "Automatic Volume Control for Visual Radio Range Beacons Developed," 2 Air Commerce Bull. 272 (1930); "Devimeter Affords Use of Radiobeacons for Courses Not Along Regular Beacon Paths," 2 Air Commerce Bulletin 201 (1930).

71. "Flying the Radio Ranges," loc. cit. note 68, p. 140; "Guggenheim Fund Reports Solution of Blind Flying Problem," 1 Air Commerce Bull. 15 (Oct. 15, 1929).

serious difficulty for the future when traffic along the airways becomes congested and planes of high speed, flying blind, may overtake and collide with slower planes flying in the same direction and at the same altitudes.

Radio marker beacons are installed at intervals along the ranges to indicate meeting points of adjacent radio range courses. They are also used at other points to indicate landing fields or topographical changes. Their range is not over five miles. Radio transmitters are available at these stations to communicate with passing aircraft for the purpose of aiding an emergency landing and giving emergency weather information. Except when used for voice transmission these markers operate continuously on assigned frequencies. Reception of communications from the planes is also possible at these points.⁷²

Further use for radio is found in the hourly transmission of weather reports to pilots in the air,⁷³ the maintenance of ground to plane communication over long distances, and traffic control at principal airports⁷⁴ whereby the order of landing is transmitted to planes in the air or instructions are given to enable the planes to land in bad weather when visibility is poor. Attempts are being made to develop radio control so that a pilot can land his plane under conditions of zero visibility.⁷⁵ Also radio direction finders have been developed for planes.⁷⁶

Pilots or other persons who operate radio transmitters used by airlines on planes or on the ground are required by the Radio Division of the Department of Commerce to possess special aeronautical radio licenses obtainable upon passing an examination.⁷⁷

In order to assist airlines to operate safely and efficiently during inclement weather, an elaborate organization has been set up for gathering and disseminating weather information for those

72. General Airway Information, op. cit. note 60, p. 85, "Radio Marker Beacon Operation," 3 Air Commerce Bull. 507 (1932).

73. "New Procedure Governing Airway Weather Broadcasts," 4 Air Commerce Bull. 13 (1932).

74. Report of Committee on Airport Traffic Control (Feb. 15, 1933), Aero. Branch, U. S. Dept. of Commerce, pp. 18-20; "Preliminary Report of Committee on Airport Traffic Control," 2 Air Commerce Bull. 299, 301 (1930); "Air Traffic Control Systems," 1 Air Commerce Bull. 11 (Feb. 15, 1930); A. P. Takafarro, "Traffic Control—An Approaching Problem," 12 Airway Age 476 (1931).

75. M. F. Eddy, Aircraft Radio (1931), pp. 18-20; "A Radio System for Blind Landing of Aircraft," 2 Air Commerce Bull. 79 (1930); "Guggenheim Fund Reports Solution of Blind Flying Problem," Loc. cit., note 71, p. 15.

76. W. Neal, "Plane Lands by Radio," Atlanta Journal, Feb. 26, 1933: Too dark and fog too thick to see airport lights at Candler Field, Atlanta, Georgia, so pilot Duke Ledbetter traced radio beam to beginning and by correctly estimating the position of the radio aerial landed safely.

77. "An Airplane Radio Direction Finder," 3 Air Commerce Bull. 433 (1932).

77. Federal Radio Commission, Radio Act of 1927. See M. F. Eddy, op. cit., note 75, p. 239 et seq.

who use the airways. Weather reporting stations are located approximately 200 miles apart both on and off the principal airways. Many of them paralleling the air routes are designated in groups and each station in a group reports in sequence, by use of the Department of Commerce teletype system, the condition of the weather at its location. This report includes the general weather condition, ceiling, miles visibility, direction and strength of the surface wind, temperature, dew point, barometric pressure, and any unusual conditions not covered thereby. In addition, certain stations report periodically the directions and strengths of the winds at elevations from the surface and every 1000 feet from 2000 to 8000 feet or higher.

Before an airline pilot takes off he must have this weather information in writing, the reports not to be over an hour old, covering the course he is to fly to his next stop. While in the air, stations on the radio range which he is following break into the directional beam transmission and broadcast weather reports at a prescribed period every hour, and every thirty minutes past the hour their own local conditions. By knowing the broadcast frequencies of the various transmitting stations and the times they are scheduled to broadcast, a pilot can tune in on more than one during an hour. In cases of sudden changes in the weather special broadcasts are transmitted.⁷⁸

The teletype system makes available another form of weather report which appears in the form of a map transmitted by master map stations to certain other stations every four hours. The figures are printed on a map in the teletypewriter and the receiving operator draws in the isobars and wind-shift lines free-hand.⁷⁹ These maps are available for use by the airline operators.

By interpreting the weather reports the pilot is able to foresee the possibilities for safe flight over his proposed route, and by the reception of weather broadcasts from ground stations and sometimes from other planes while in flight he can check against his judgment.

78. General Airway Information, op. cit., note 60, pp. 94, 122. For further information and authorities see the following: "Collection of Weather Information by Teletype," 1 Air Commerce Bull. 10 (Mar. 15, 1930); "Radio Supplement to Automatic Telegraph-Typewriter System Being Developed," 2 Air Commerce Bull. 620 (1931); "New Procedure Governing Airway Weather Broadcasts," op. cit., note 73, pp. 13-15; "New System of Schedules for Broadcast of Airways Weather Information Now in Effect," 3 Air Commerce Bull. 438 (1932); "Procedure Dealing With the Radiobroadcast of Weather Reports Revised," 1 Air Commerce Bull. 5 (June 15, 1930); "Interpretations

79. General Airway Information, op. cit., note 60, pp. 124-127; "Teletypewriter Weather Map Service Now in Operation," 4 Air Commerce Bull. 290 (1932); "Teletypewriter Transmission of Weather Maps," 4 Air Commerce Bull. 83 (1932); "Weather Maps to Be Transmitted by Automatic Telegraph Typewriter Circuits Operated by Aeronautics Branch," 3 Air Commerce Bull. 58 (1931).

There are, however, certain conditions which render additional equipment necessary in order to detect and avoid the consequent danger. Temperature and dew point readings indicate when moisture in the air is likely to condense and form ice, but it is not easy to tell when this ice actually begins to form on a plane while in flight. Its characteristics are that it clings to protruding edges of the plane and on the propeller so as to greatly increase the weight, and also forms thickly along the leading edges of the wings. The effect of this wing formation is to elongate the contour of the wing section and thus change the camber, or wing curvature, so that it will not produce as much lift as was originally contemplated in the design. This is likely to force the plane to come down and strike the ground in the normal attitude of flight and at high speed—a highly dangerous situation. To avoid this condition, “ice-indicators” have been developed, and “de-icers” have been installed on some planes, operating mechanically to break the ice loose from the leading edge of the wings.⁸⁰

With weather conditions uniformly tabulated for him, a pilot can interpret them, and at the same time devote his attention not only to his engine and airplane instruments, but also to the observation of the various aids to navigation already mentioned.

Federal Control: Pilot Qualifications:

In furtherance of the utilization of navigation facilities the Department of Commerce initiated a new requirement for interstate airline pilots effective January 1, 1933. Under this rule a pilot must not only hold a transport license entitling him to fly planes of the class and weight which he operates, but he must have had at least 1200 solo flying hours within the last 8 years, of which 500 hours must have been cross-country, 75 hours at night (50% of which were cross-country over lighted airways), and 15 hours of blind flying instruction. Furthermore, he must pass a practical flight test in blind flying, given by a Department of Commerce inspector.⁸¹ This ability to fly blind includes the proper utilization of the radio range signals as well as the manipulation

80. C. H. Biddlecombe, “Eliminating the Ice Hazard,” 7 *Aviation Engineering* 7, 33 (Sept. 1932); “Ice-Warning Thermometers for Airplanes,” 1 *Air Commerce Bull.* 7 (Mar. 1, 1930).

81. Federal Regulation, 4 *JOURNAL OF AIR LAW* 86 (1933); *Air Commerce Regulations*, Amendment No. 3 of 1932, 1932 U. S. Av. R. 286; “Scheduled Air Transport Rating Included Among Amendments to Regulations,” 3 *Air Commerce Bull.* 555 (1932); “Scheduled Passenger Airline Conference,” 3 *Air Commerce Bull.* 87 (1932). See also: “Pilots Carrying Paid Passengers Required to Have Special Authority,” 1 *Air Commerce Bull.* 9 (Feb. 15, 1930).

of the plane solely by the interpretation of instruments under conditions of zero visibility.⁸²

This Scheduled Air Transport rating for pilots, however, applies only to those airlines operating under a certificate of authority from the department of Commerce to carry passengers.⁸³ And the requirements that transport pilots be rated according to type and weight of planes which they are qualified to fly applies only to the carriage of passengers for hire.⁸⁴ Consequently, there is no special requirement for pilots carrying express. Any transport, limited commercial or industrial pilot may navigate an interstate freight line under present rules.⁸⁵

However, practice has shown that pilots of great skill and experience are required for the carriage of air mail, in order to set a performance record as nearly perfect as possible. Competition for express business may bring about this same requirement if regulations and laws do not.

At present, we can expect to find air express carried in mail or passenger planes manned by highly trained personnel who meet the license requirements for the carriage of passengers in interstate commerce.

Federal Control: Airline Operation Regulation:

As long as express is transported with the mail or by itself with no passengers there are practically no regulatory restrictions, aside from those governing ordinary interstate flights by private aircraft. Although the minimum safe altitude over open country is fixed at 500 feet, it may be deviated from when weather or other unavoidable conditions make it necessary.⁸⁶ However, where passengers are carried, this minimum altitude rule cannot be deviated from except in the case of airlines operating under Certificates of Authority when terrain and local weather conditions make it

82. "Flight Test for Scheduled Air Transport Rating," 4 Air Commerce Bull. 264 (1932); "Airways Radio Stations Contribute to Safety and Reliability of Aircraft Operations," 4 Air Commerce Bull. 361 (1933).

83. Amendments to Air Commerce Regulations Governing Scheduled Operation by Interstate Passenger Air Transport Services, Effective Oct. 1, 1931, 1931 U. S. Av. R. 250; Air Commerce Regulations Governing Scheduled Operation of Interstate Passenger Air Transport Services, Effective Midnight, May 15, 1930, 1930 U. S. Av. R. 325.

84. "Pilots Carrying Paid Passengers Required to have Special Authority," Loc. cit., note 81, pp. 9-10.

85. Air Commerce Regulations, 1928, Sec. 47, A, B, C, 1928 U. S. Av. R. 391.

86. Amendment to Air Commerce Regulations, Effective Midnight Dec. 31, 1930. "Sec. 79. Deviation from Air Traffic Rules. The air traffic rules may be deviated from when special circumstances render a departure necessary to avoid immediate danger or when such departure is required because of stress of weather conditions or other unavoidable causes: provided, however, that aircraft carrying passengers for hire shall not deviate from the air traffic rules pertaining to minimum altitudes of flight because of stress of weather conditions": 1930 U. S. Av. R. 323. See also: "New Amendment to Air Commerce Regulations," 1 Air Commerce Bull. 6 (Feb. 15, 1930).

necessary, provided the pilots involved possess Scheduled Air Transport ratings, and provided that:

"1. There is definite indication of favorable or improving weather conditions ahead.

"2. There is sufficient ceiling to permit safe maneuvering of the airplane without danger of striking any object or objects on the ground, and that there is a visibility of at least two miles in daylight, and from beacon light to beacon light during hours of darkness.

"3. In the hours of darkness, directional radio is in operation over the route and the plane is equipped for the reception of its signals as well as weather broadcasts.

"4. The pilot in his own judgment believes the flight can be accomplished with safety.

"5. Permission of the operations manager or his properly designated representative is secured after such manager or his representative has been supplied with full information on weather conditions encountered or to be encountered. Records of such authority shall be kept in the form of a log of the radio conversation or signed clearance sheets."⁸⁷

Passenger airliners may be operated over fog or clouds when necessary (but not for protracted periods) under no worse conditions than the following:

"1. When equipped with directional radio and weather broadcast receivers airplanes are permitted to proceed over the top or through solid fog and clouds, provided that:

"(a) At the time of take-off there is at the point of departure sufficient ceiling and visibility to permit the airplane to be safely maneuvered and landed without danger of striking any object or objects on the ground, and the point of intended landing is clear, and further, provided that:

"(b) Within the fuel range of the airplane, exclusive of the required 35% reserve, there is an airport or intermediate field other than the point of intended landing which is clear, to which the pilot may be directed. (For the purpose of this regulation, 'clear' is interpreted as meaning not less than 1,500 feet of ceiling and two miles of visibility.)

"2. When equipped with directional radio and weather broadcast receivers, and while maintaining a two-way radio communication with ground stations, airplanes may be operated over the top or through solid fog and clouds, provided that:

"(a) There is, at the time of take-off, sufficient ceiling and visibility at both the intended point of landing and the point of departure to permit the airplane to be safely maneuvered and landed without striking any object or objects on the ground. (This provision contemplates the establishment of certain limitations affecting ceiling and visibility at various terminals.) Further provided that:

87. Amendments to the Interpretations of the Air Commerce Regulations Governing Scheduled Operation of Interstate Passenger Air Transport Service (Bull. No. 7-E), 4 JOURNAL OF AIR LAW 89 (1933); "Interpretations for Air-line Regulations," 4 Air Commerce Bull. 177 (1932); "Scheduled Passenger Air-Line Conference," 3 Air Commerce Bull. 87 (1931).

"(b) Within the fuel range of the airplane, exclusive of the required 35% reserve, there is an airport or intermediate field where weather conditions are favorable, to which the pilot may be directed, further provided that:

"(c) Specific permission of the operations manager or his properly designated representative is obtained prior to starting through or over the top. Records of such authority in the form of logs of the radio conversation or signed clearance sheets shall be kept in all cases, and further provided that:

"(d) The pilot in his own judgment believes the flight can be accomplished with safety."⁸⁸

Under the above conditions we may expect all airline operations to reach a high degree of safety. A question which arises in connection with the carriage of passengers is whether or not an express messenger would be considered a passenger within the above requirements. If he were an employee of the airline he would seem to fall outside the classification of passengers for hire. At the same time, if he is employed by an Express Company which is apart from the airline and pays the airline for its accommodations, a different result is *prima facie* apparent. However, when we consider that any express company which employs messengers to accompany shipments will probably be owned directly or indirectly by the airlines which they patronize, in the same manner in which the railway express companies were and are owned by the railroads,⁸⁹ the first result seems the most feasible.⁹⁰

V. AIR EXPRESS RATES

Factors Affecting the Rates:

(1) *Decreasing Costs*—Airline operation offers another illustration of a business subject to the law of decreasing costs—a business in which the cost of operation grows less rapidly than the volume of business done. Certain costs are fixed and, of the

88. Amendments to the Interpretations of the Air Commerce Regulations Governing Scheduled Operation of Interstate Passenger Air Transport Service, Aero. Bull. No. 7-E, loc. cit., note 87, pp. 88-89, 1932 U. S. Av. R. 292; "Interpretations for Air Line Regulations," Loc. cit., note 87, pp. 177, 178-179; "Scheduled Passenger Air-Line Conference," Loc. cit., note 87, pp. 87, 88-89.

89. W. J. Jackman, *Express Service and Water Transportation* (1912), pp. 55-63.

90. In a letter, Feb. 21, 1933, Mr. Richard S. Paulett, Chief, Enforcement Section, Aeronautics Branch, Department of Commerce, answers these questions as follows: "It would seem that, if the fare of the express messenger is paid by the express company whether or not the messenger is an employee of the airline, in such instance the messenger might technically be deemed to be a passenger and if the service was run on schedule, it might possibly be declared to be a scheduled passenger carrying operation."

"I believe that, where messengers are carried on scheduled express services and the express line is not owned by the airline but only supplies the planes, there would more than likely be an agreement between the airline and the express company for the free carriage of messengers or other employees necessary to handle the express matter."

operating costs, some are constant and some variable. Each item carried for compensation, which is added to existing traffic, costs relatively less to transport. Net returns will increase more than proportionately with an expansion of traffic. Hence an airline which derives a steady income from mail and passengers can afford to offer an air express service to the public at rates which will yield only a slight profit in excess of the handling and carrying costs, and, in the ultimate accounting, aid in showing a substantial profit for the combined operations.

(2) *Joint Costs*—The airlines also operate under conditions of joint costs. Thus, they offer a variety of services (including carriage of mail, passengers, and express) which in the aggregate cost a certain sum—the total of fixed charges and operating expenses, but it is quite impossible to determine what any single part of these services will cost, or what one service will cost. The apportionment is determined by the relative intensity of demand for each of the joint services. Thus, air mail revenue now bears the greatest burden of supporting an airline's fixed costs, it being subject to some reduction due to the increasing volume of passenger traffic. Air express, on the other hand, supplies scarcely 1% to 5% of the revenue and, consequently, is dependent on the other services for its own existence. When air express revenue becomes greater in proportion to that derived from mail and passengers, then changes may be expected in the level of the latter charges.

(3) *Influence of Mail and Passenger Revenues*—When the commercial airlines were first organized in 1926, the purpose was to carry only one commodity—air mail. The federal government had been carrying air mail since 1918, but, by 1926, felt that the carriage by private contractors would provide a more extensive and, possibly, less expensive service. The value of an air network to establish lines of communication for national defense was also considered.

The first mail rates paid by the government to the operators were fairly high and had to be so since they provided the sole source of income. Subsequently, these rates were lowered slightly due to changing conditions. In 1930, the Watres Act⁹¹ practically compelled the air mail carriers to provide space for passengers on the mail planes. This resulted in an increased income to the contractors and paved the way for further reductions in mail rate

⁹¹. Cfr. note 53. "Air Mail: The Watres Act in Its Workings," 31 Aviation 106 (1932).

payments. The competitive bidding for air mail contracts also aided in the reduction of payments.

The additional net income derived from passenger traffic of the air mail lines illustrates the application of the principle of decreasing costs, already mentioned. An extension of this principle shows clearly the reason that air express is considered of importance—secondary to the passenger business. Air express is now being carried by these mail lines mainly because the airlines have found that they cannot keep their equipment filled with mail or passengers. Space is left in the baggage and mail compartments (and sometimes in the passenger section) where small express packages can be carried without interfering with the rest of the cargo. At the same time, it provides an additional income (above its separate costs) with which to help off-set the costs of the other, and better-paying, services. As the volume of air express increases, the importance of the express income is becoming more clearly recognized and the airlines are specifying that larger, and more appropriately fitted, express compartments be included in their newer planes.

Another reason for developing the air express business is to be found in the recent reduction in the volume of air mail carried (and consequent loss of income)—due partly to the increase in air mail postage rates to eight and thirteen cents.

Originally, air passenger rates were fairly high—too high to be productive of great revenue. Besides, there were many difficulties to be overcome in addition to charges. It was necessary to educate the public to the safety of air travel, to develop a regular and dependable schedule of operations, and to offer rates that would be acceptable during a period of economic depression. The increased volume of passenger business now so definitely established cannot fail to have an influence upon the rates for all air carrier services.⁹²

We have seen that air express is dependent upon passenger and mail schedules and the consequent maintenance required thereby for its own carriage. This often has the effect of preventing fast through shipments when more than one line is involved. The charges are not always certain on a different line. And sometimes it is necessary to transfer shipments from one airport to another many miles away at a junction point of two lines. The Post Office Department, however, requires air mail carriers to use the same

⁹². *M. W. Watkins*, "Air Transport Rate-Making," 3 *Air Law Rev.* 127 (1932).

airports. All of these factors tend to produce a lack of uniformity which detracts from the value of air express to the shipper. This is being overcome to some extent, however, with the formation of General Air Express and by its competitor the Railway Express Agency.

Other factors which influence rates are the use of regular passenger and mail planes for carrying express, and the lack of specialized personnel or warehouse facilities for handling it. These considerations have a tendency to keep the rates up. One reason already mentioned is that the air carrier is not particularly interested in air express, but devotes most of its efforts to carrying passengers or mail. The limited space aboard a passenger or mail plane limits the amount of express which can be carried as well as it restricts the size of individual shipments. The lack of specialized personnel for handling and the lack of warehouse facilities also affect the volume which can be satisfactorily handled. And they increase the risk to which the carrier is subject due to loss or damage to shipments.

(4) *Operating Difficulties*—The actual airline operations present a considerable risk to the carrier of goods under present conditions. The aids to navigation and other facilities for affording safe passage by air have been discussed. And it is known from accident statistics that occasional crashes, particularly in the carriage of air mail, are to be expected. The danger to purely express planes from crashes will be tempered considerably by the financial risk involved, not only of liability to the shippers but to the owners of the equipment. It is well-known that crashes very often result in the total destruction of the plane and the cargo. Unquestionably, *airline* express companies are common carriers⁹³ and hence liable without fault, except for those risks excepted by law. This compels the carrier to pass on to the shipper charges sufficient to cover his own estimated liability and to cover the cost of insurance, particularly on shipments of great value.

The same operating factors, however, also work to force rates down as a competitive measure against railway express. Weather conditions frequently compel the cancellation of flights and, sometimes, cause forced landings enroute. These conditions tend either to prevent air shipments entirely or to slow them up to such an extent as to give air express an element of unreliability. Whatever the reason, it will be reflected in the rate that can be charged for the service.

93. F. E. Quindry, "Airline Passenger Discrimination," 3 JOURNAL OF AIR LAW 479, 480 (1932).

(5) *Private Carrier Competition*—Practically the only competition which the airline need fear is that a private plane owner may contract specially to carry a certain shipment. The possibility of this is usually remote, since most private owners demand very high prices for special trips. This is due partly to the operating cost necessary to return the plane to its base, partly to its high original cost, and partly because private plane operators have been accustomed to receiving abnormally high returns during better times. Even if the private plane owner should offer serious competition in individual cases, it is doubtful if the airline would change its rates. It carries air express mainly to fill up space not occupied by passenger or mail. It is to be noted, however, that this condition is rapidly changing, and some airlines are extending their efforts to reach the express shipper at the same time that they go after the prospective air passenger. This changing condition has produced a considerable reduction in air express rates, but they are still too high to attract regular shipments of many types of high class goods.⁶⁴

94. Company	Air or Rail	Yr.	Chicago—New York						New York—Los Angeles					
			1 lb.	5 lb.	10 lb.	70 lb.	100 lb.	200 lb.	1 lb.	5 lb.	10 lb.	70 lb.	100 lb.	200 lb.
Railway Exp. Agy. (a)	A	1927	\$1.00	\$5.00	\$10.00	\$70.00	\$100.00	\$200.00	\$2.60	\$13.00	\$26.00	\$182.00	\$260.00	\$520.00
T.W.A.-Greyhound Bus (b)	A	1932	1.45	3.20	5.70	32.20	40.70	80.70	2.25	6.95	13.20	77.70	100.70	200.70
General Air Express (c)	A	1933	1.25	2.30	3.80	22.50	31.75	62.50	1.78	5.70	10.60	70.10	99.75	198.50
Railway Exp. Agy. (d)	A	1933	1.25	2.04	3.44	21.00	30.00	60.00	1.80	5.64	10.44	70.00	100.00	200.00
Railway Ex. Agy. (e)	R	1933	.38	.52	.69	2.76	3.80	7.60	.47	.95	1.54	8.71	12.30	24.60
Parcel Post (f) R	R	1933	.11	.33	.59	3.7715	.59	1.14	7.74

(a) Based on charges per $\frac{1}{4}$ pound (not more than 50 cu. in. per $\frac{1}{4}$ pound). Value not to exceed \$50.00 for packages weighing less than 100 pounds, and 50c per pound actual weight over 100 pounds: Aircraft Year Book, 1928, p. 455.

(b) Rate is per pound or per 200 cubic inches if actual weight is less than one pound per 200 cu. in. No single package weighing over 150 pounds or 35"x19"x63" is accepted without special arrangements. Packages valued in excess of \$5,000 not accepted unless arranged for. Liability limited to \$50.00 for less than 100 pounds, and 50c per pound over 100 pounds. Cargo full coverage insurance available to shipper at rate of 35c per \$100.00 within zones, 50c between adjacent zones, and 65c between zones 1 and 3: Joint Air Bus Tariff No. 1, effective Feb. 8, 1932.

(c) Rates based on 200 cu. in. per pound. Lot shipments permitted. Single packages not to exceed 200 pounds or measuring not more than 150 inches combined length and girth only accepted except by special arrangement. Liability limited to \$50 per shipment with charge of 10c per \$100.00 declared excess value. Shippers express insurance available at rate of 15c per \$100.00 excess declared value besides carrier's charges: Interline Tariff, effective Aug. 8, 1932.

(d) Rates based on 100 cu. in. per $\frac{1}{2}$ pound. Packages weighing in excess of 200 pounds or measuring more than 106 inches length and girth not accepted without special arrangement. Value limited to \$50 for 100 pounds or 50c per pound if over 100 pounds. 15c per \$100 excess declared value charged. Fractional weights over pound of 3 ounces or less disregarded, 4 to 12 ounces count as $\frac{1}{2}$ pound, and over 12 ounces count as full pound: Air Express Tariff No. 4, effective Dec. 1, 1932.

(e) First class rates based on actual weight. Aggregate weights of several shipments permitted if packages do not average less than ten pounds. Value limited to \$50 for 100 pounds and 50c per pound in excess thereof. 10c per \$100 charged for excess declared value. Where shipments weigh over 1,100 pounds and are valued over \$550 the charge for excess value is 25c per \$100 between points where rate is not over \$1.00 per 100 pounds, 30c where it is \$1.00 to \$3.00, 35c where it is \$3.00 to \$5.00, 40c where it is \$5.00 to \$8.00, and 50c where it exceeds \$8.00. Value of certain live stock specifically limited. Special rates apply to coins, currency, bullion and securities: Official Express Classification No. 31, effective Mar. 20, 1930.

(f) No shipments accepted which weigh over 70 pounds or measure more than 100 inches combined length and girth. Parcels measuring more than 84 inches are charged for minimum of ten pounds. Special delivery charges for two pounds or less is 10c, for 2 to 10 pounds, 25c, and over 10 pounds, 35c. Insurance charges are 5c for not exceeding \$5.00 valuation, 10c for \$25.00, 15c for \$50.00, 25c for \$100.00, 30c for \$150.00, and 35c for value not to exceed \$200.00.

(6) *Air Express Rate Limitations*—Although express rates can be made relatively low, it is doubtful that they will fall below those of first class railway express rates. One simple reason for this is that the railways can, under present conditions, lower their own rates sufficiently to retain the traffic which might otherwise be carried by air. Another reason is that the service rendered is superior to that furnished by the railroads.

(7) *Reasonableness* as a basis for maximum air express rates has not entered into the question from the point of view of public benefit, but is being reached by experiment which, with competition, tends to reduce the rates to such low levels as to attract greater volumes and different types of goods.

(8) *Peculiarities of Air Express*—We now find air express in a position to follow somewhat the same steps as were followed by the passenger business. However, a few of the elements are missing and some are added. The idea of fear is not present when a shipper intrusts a package to an airline, unless it is so precious that its loss, due to a crash, may be of irreparable injury to him. Usually, his main concern is cost and a correspondingly superior service to compensate for charges additional to those made by railroads. Furthermore, from the point of view of the airline, the additional costs in transporting express are less than those in transporting passengers. The reason is that express packages can be placed in any available space and in any kind of a plane, whereas each passenger must be given personal attention, a comfortable seat, plenty of leg-room, and light. Moreover, liability can usually be ascertained in advance on air express shipments, but there is no limit to the liability to which the airline subjects itself when it carries a passenger.⁹⁵

(9) *Air Freight*—Another factor previously mentioned will also have profound influence on air express rates. Most of the larger airlines, in their competition for passenger business, are announcing that shortly they will use planes of speeds ranging from 50 to 75 miles per hour faster than those now in use. What will become of the passenger planes being used at present? Probably some will be still used for passenger service on short lines where competition is not so acutely felt. However, there are few passenger planes now in use which are not obsolete in the light of developments in design. Many of these planes have been entirely written off or depreciated, and the rest partially so. Consequently,

95. G. W. Ball, "Compulsory Aviation Insurance," 4 JOURNAL OF AIR LAW 52 (1933).

the carriage of either air express or air freight offers an admirable opportunity to obtain further use from this equipment. Seats and other passenger facilities can be stripped from the cabins to make room for high pay loads.

These planes can be used for carrying express or freight at a very low cost which need not greatly exceed that of maintenance and actual flying. It is expected that they will make available a slow air transport service from airport to airport, from central terminal to terminal, or a service similar to railroad store-door delivery at low enough rates to attract medium class commodities in great bulk.

Classification:

Air express rates, at present, apply equally to all classes of goods, since only emergency or higher class shipments are now expected. Also, the available space is necessarily limited in an airplane, so that it would not pay to carry more goods at a lower cost in many cases. However, this applies only if the higher class of goods occupies all of the space. If it does not, then it seems logical to attract lower classes of commodities by offering slightly lower rates to them. This is, of course, the rate basis for railway express which classifies shipments in three classes. Articles in the third class are given commodity rates which have certain relationships to the first or second class rates. First class rates apply to all articles not classified elsewhere. And second class rates apply to articles of food and drink and other articles so listed. These classifications are uniform throughout the United States.⁹⁶ The system is similar to the railroad freight classifications, except that the latter are not uniform but are listed differently in certain defined territories. Nor do they confine themselves to only three classifications each.

The classification principle is applicable, to some extent, in air express when defined to mean movements at passenger plane speed, but it is practically essential that it be considered in operating planes carrying only express or air freight.

An example of what is meant by this air classification is found in the availability of shipments by air of fresh fruits and vegetables from the southern to the northern markets.⁹⁷ Sufficient quantities are available to make a fair profit for the carrier, *provided* it does

96. Official Express Classification No. 31 (effective Mar. 20, 1930), p. 17; E. S. Ketchum, op. cit., note 20, pp. 249-323.

97. F. Haag, Jr., op. cit., note 1, p. 11.

not have to fly its plane back to the base *empty* or nearly so. In order to be able to carry the fresh fruits and vegetables, the carrier will gladly accept a lower class commodity for a return shipment if this will pay it enough to make the gross income for the entire round trip exceed the gross expenses. Thus it will be possible to offer commodity rates actually lower than carrying costs and with no consideration for the company's fixed costs. The condition is illustrated by the previously mentioned shipments between Boston and New York where those from New York were 40% higher in volume than from Boston.⁹⁸ It indicates the necessity for classifying commodities so as to attract other types of goods at lower than first class rates and thus fill up available space in returning planes.

The range of this classification will depend upon the kind of commodities which can be attracted to air express and the extent to which air transportation can develop new markets. These new markets are available for shipments of luxury foods such as frozen foods, fresh fish, and delicacies not now obtainable in some communities. Besides this, it brings territory now unattainable to some industries within the scope of their effective sales. The immediate result of this is to permit reduced inventories, hence lower taxes, and a more rapid turnover of goods. The effect on the air carrier is to give it a greater number of air shipments in one direction. In order to fill up its planes for the return trip, it will offer low enough rates to attract commodities which will be of use to people at the other end of its line.

Computation of Rates:

The mechanics of computing air express rates are not complex under present arrangements. The rates are usually a certain amount per mile with a graduated charge for more than one pound.⁹⁹ The greatest difficulty is found in accounting for pick-up and delivery charges. Oddly enough, the charges for carrying by air over distances amounting to several hundred miles are less than the cost of picking up parcels and delivering them. One reason, of course, is that airports are usually several miles from towns. A basic charge including pick-up and delivery is therefore made by both Railway Express Agency and General Air Express of \$1.00

98. *Ibid.*, p. 7.

99. Railway Express Agency air express rates are based on a charge of 1c per $\frac{1}{2}$ pound per 50 miles plus a package handling charge of 80c for one pound and decreasing at the rate of 2c per $\frac{1}{2}$ pound until it disappears at 21 pounds: Letter from George E. Lee, Vice-President, Railway Express Agency, Mar. 1, 1933.

and \$1.25 respectively for air shipments. Such basic charges are in effect for air express where pick-up and delivery services are provided by other companies. Usually the latter charge is graduated at a certain amount per pound over five pounds. Many air express carriers will permit lower charges to regular shippers where no services aside from the air carriage are desired. An airport to airport service with such lower rates is now being operated by Varney Air Service between Oakland, San Francisco and Sacramento. A similar low rate service was operated from New York to St. Louis by Transcontinental and Western Air prior to the organization of General Air Express.¹⁰⁰

The basis for making charges on airlines for express is somewhat different from that used by railway express. The difference is due partly to the fact that railway express touches thousands of cities while air express touches only a little over a hundred. Also, the railway system has been brought about by the Interstate Commerce Commission. A revision of express rates and classifications was found to be necessary mainly because there was no uniformity in rates, there were no published tariffs, and only an experienced person could understand those that were available in printed form. The ordinary express shipper was the small shipper who did not possess the necessary technical knowledge. Therefore a simplification was brought about to protect the public.¹⁰¹

Briefly, the railway express system is based on blocks and zones. The country is divided into five zones roughly paralleling the freight zones of the railroad. In some the basic distance rates and terminal charges are different from others, according to the varying marketing conditions and difficulties of transportation. Super-imposed over these zones is a gridiron of blocks, covering the entire United States. Each block covers an area of approximately fifty miles square, the boundaries of which parallel the meridians of longitude and the parallels of latitude. The charges are graduated according to the number of blocks between points and according to the number of pounds weight, with fixed charges being added for the use of terminal facilities. For charges between points within blocks or to adjacent blocks a sub-block system is used, each block being divided into 16 sub-blocks.¹⁰²

The Parcel Post system, with which air express comes into competition, has a system somewhat different from that of the

100. Cit. note 3.

101. *E. S. Ketchum*, op. cit., note 20, pp. 115-141.

102. *In re Express Rates, Practices, Accounts and Revenues*, 24 I. C. C. Rep. 380 (1912); *E. S. Ketchum*, op. cit., note 20, pp. 213-246.

railway express. It divides the country into eight zones of 50, 150, 300, 600, 1,000, 1,400, and 1,800 miles radius from each of 30 minutes squares into which the country is divided. Rates are computed on parcel post shipments as fourth class mail matter. A basic rate is charged for the first pound to each zone and a certain amount is added thereto for each additional pound, the amount depending on which zone is involved.¹⁰³

A zone system is now in use by Pan American Airways for making express charges. However, there is only one outstanding example of it in this country. A combination rate, applying equally within each of three zones dividing the United States, has been used by Transcontinental and Western Air and Greyhound Bus Company for joint air and bus express shipments. However, it is not ascertained how these rates were computed or on what basis the zones were established.

There is no uniform rate basis for air express, except such as is found on the lines represented by General Air Express or by the Railway Express Agency, and these latter vary as between the same cities. The smaller airlines giving local air express services charge whatever rate seems reasonable under the circumstances, the principal concession being made to pick-up and delivery charges.

103. *E. S. Ketchum*, op. cit., note 20, p. 510.