"A SURVEY OF THE AERONAUTICAL INDUSTRY IN KANSAS CITY"

by

Clarence H. McGregor

B. S. Educ.
Kansas State Teachers College of Emporia
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Approved by:

Ernest P. Jensen
Instructor in Charge

Frank T. Stockton
Head of the Department

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PREFACE

During the past three years there has been a rapid development of the aviation industry in all sections of the United States, much of which has occurred in the three principal cities of this territory, St. Louis, Wichita, and Kansas City. The purpose of the present study is to analyze the development in Kansas City, to appraise the advantages or disadvantages afforded by the city for the permanent development of the industry, and to compare with that in other centers.

The term "Kansas City" is used throughout the thesis to include the aeronautical activities of both Kansas City, Kansas, and Kansas City, Missouri. The analysis is made of the combined industry, criticisms and recommendations being directed to the industry as a whole rather than to that in either of the respective cities.

The Aeronautics Branch of the United States Department of Commerce and a number of current magazines publish timely and authentic information on the general aeronautical industry, but a comparatively small amount of information concerning the activities in any particular center is available from these sources. It has, therefore, been necessary to secure the material for this study from articles published in the local magazines and newspapers and through personal interviews. The data secured from these local sources have been verified insofar as possible and only that information is presented which is believed to be correct.

I am indebted to Professor Jens P. Jensen for his aid in the arrangement and composition of this thesis and wish to express my sincere thanks to him. I also wish to express my appreciation to Dean Frank T. Stockton, who suggested the subject, to the secretaries of the Chamber of Commerce organizations of both Kansas Cities, and to the aviation executives who have given assistance in the preparation of the thesis.

April, 1930. C. H. McGregor

CHAPTER I

HISTORICAL DEVELOPMENT

The indispensable forerunner of civilization is transportation. "Three fundamental developments have taken place in its history: first, the boat, built to float on water; second, the wheel, made to roll on land, and third, the wing, fashioned to fly in the air."[1]

The wheel and the boat have been utilized by man for centuries; the wing in less than a quarter of the present century; yet this last development has already become of sufficient importance to be classified as one of the major industries of the nation.[2] It may be as Rudyard Kipling has said of this new form of transportation, "It is the opening verse of the opening page of the chapter of endless possibilities."

A. Early History of Flight

"Throughout the history of mythology and religion, the attainment of flight has been uppermost among the aspirations of man. In most mythologies and religious systems, the supreme beings who ruled the universe were given their abode in a vague region far above the earth, and the ability to soar the atmosphere became an essential

1. Biddlecombe, C. H., Major of the Royal Air Forces, in an address before the American Philosophical Society in 1928.
2. So classified by Pynchon & Company, investment bankers, and numerous others.

attribute of godliness. Next to immortality, flying was the one element that differentiated a deity from common mortals."[1]

Man's observations of flight were: first, the bird, and second, the ascent of smoke. From these two types of aerial movement there arose the two divisions of aeronautics, namely, aerostation, the science of lighter-than-air craft, and aviation, the science of heavier-than-air craft.

The earliest stories of flight by man are pure legend. But it is certain that before 360 B. C. a flying model was actually constructed for Aulus Gellius said of it "in imitation of a dove made of wood -- made to fly by regulated mechanics."

During the Middle Ages little, if any, progress was made in mechanical flight. Due to certain religious concepts of the time, flying, or the desire to fly, was looked upon as blasphemous. Documents concerning flight were destroyed and the authors punished. Even as late as the thirteenth century, Roger Bacon was pronounced insane for suggesting that man might some time actually fly![2]

Leonard Da Vinci, an Italian scientist, in his book "Codex on the Flight of Birds" written in 1505, discussed many of the present day problems of flight. In this test he expounded the principles of the air-screw, now known as the propeller, "stream lining", and certain principles of aerodynamics. "His explanation of the motion of a bird's

1. From an article "Human Flight Throughout the Ages" reprinted in the Annals of the American Academy of Political and Social Science, Vol. 39.
2. From an article by Dennis Farmer in the Mentor, September, 1929.

wing has not hitherto been seriously challenged, our present knowledge on that point has not materially progressed beyond his."[1] This scientist is also given credit for the invention of the parachute and the designing of the first helicopter.

The French succeeded in making the first balloon ascension in 1783. Sir George Cayley, an Englishman, is considered the pioneer[2] in the development of the glider, the forerunner of the modern airplane. Lilienthal, a German, developed the glider to a high degree of perfection.

B. Aeronautics Prior to the World War

As early as 1890, Clement Ader, a French engineer, produced a "machine" capable of power driven flight. This contrivance was later powered with a 30 horse power steam engine and in a test succeeded in flying 164 feet. In 1896, Professor Samuel Langley, an American, duplicated this success. A year later, Ader succeeded in flying a model 1000 feet but in all of these early attempts no means were available for the control of the planes and in each test the model crashed.

Although lighter-than-air craft was the first to be used and perhaps to some extent simpler to operate, the Americans have shown comparatively little interest in aerostation. With few exceptions, the attention of American aeronautical leaders has been

1. Annals of the American Academy of Political and Social Science, Vol. 39.
2. Biddlecombe, C. H., member Royal Air Forces, address cited above.

directed to the development of heavier-than-air craft.

Before 1890, Professor Langley, with the assistance of Manly, an engineer, experimented with a gasoline engine to be used in a glider. In 1896, a motor was installed in a flying machine called the "aerodrome" and successful tests were made.

Langley appealed to Congress for financial assistance in developing an "aerodrome" capable of carrying a man. Limited financial appropriations were made and a test flight was attempted in September, 1903. The ~~capitulating~~ catapulting device used to launch the plane was not correctly constructed and the test was a failure. The plane has since been proved capable of flight, but the first failure came to be known as a classical fallacy, and Langley was ridiculed for his experiments.

America's failure to fly heavier-than-air craft was of short duration, for on December 17, 1903, less than three months after Langley's failure, Orville and Wilbur Wright succeeded in making the first controlled motor-powered plane flight at Kittyhawk, North Carolina. This epochal flight lasted 12 seconds and covered 120 feet.

The possibilities of aircraft in warfare were early recognized, but governments were slow in accepting the airplane as a part of the military equipment. Until the United States purchased the first government plane in 1909 no particular military development was made. From this date, however, the development was rapid and by 1914 all of the world powers maintained aviation units as an integral part of the military organization.

The airplane for civilian purposes was also slow to be accepted. The first airplane was sold in 1904 and only five were sold for personal use in the next ten years.

At this time there were 541 certified aviation pilots in the world, of which 353 were French and 26 Americans, the two countries being at the top and the bottom of the list respectively.[1]

C. Effects of the War

The World War had a profound effect on the development of the aviation industry. "Four years of war produced results that would have probably required fifteen years of peace."[2] The Aeronautical Bulletin, No. I of March 15, 1928, summarized the effect of the War on the aeronautical industry in the following words: "Many new aircraft factories had been built, hundreds of aeronautical engineers and designers were given an opportunity to demonstrate their skill, 10,000 pilots were taught to fly; nearly 17,000 planes were manufactured, scores of thousands of artisans became skilled in aircraft production; all of which created a personnel and material out of which was to develop the postwar aviation which differs so widely from European civil development.

"With peace, no inconsiderable percentage of those who had been engaged in the manufacture of aircraft or trained as pilots became actively interested in the civil possibilities.

1. From a report of the Proceedings of the American Philosophical Society, 1927.
2. Ibid.

"The 'air service operator' sprang naturally out of the war experience. Hundreds of army and navy pilots, too young to have had much business experience, found themselves with a great desire to continue in the alluring field of flight. As the government had thousands of surplus planes and engines to be disposed of, these war pilots, with others, created a considerable market and they soon developed into a nation-wide group of air propagandists largely responsible for such airmindedness of the American people as exists today, while at the same time they were putting the airplane to useful work.

"The war surplus of planes and engines thus enabled many hundreds of civilian and ex-service pilots to finally establish themselves permanently in more or less profitable enterprises in as many towns of the country, carrying passengers on short rides, giving instruction in flying, doing aerial photography, making cross-country flights in response to emergency or other calls, and generally developing the commercial air service peculiar to the United States.

"By the end of 1926 the war surplus of aircraft had become about exhausted and there had been marketed a number of low-priced airplanes of entirely new construction still utilizing war surplus engines of low power. In 1927 the new construction doubled, the war surplus of engines neared exhaustion, and there was developed the cabin type of airplane especially designed for air transport, with modern higher powered engines."

D. Public Acceptance of Aviation

In spite of the role played by aviation in the World War and the sale of the surplus aviation supplies to civilians, the American public as a whole showed little interest in the development of the industry as a commercial enterprise. The average American still considered aviation as an exhibition and little, if any, thought was given to the practicability of aeronautics as a means of transportation for either business or pleasure.

The public interest was little aroused until the world flight by the Army fliers was made in 1924; even then, the interest did not become effective. America was not consciously "airminded" until Colonel Charles Lindbergh made his spectacular flight in May, 1927. Then came the Dole flight to the Hawaiian Islands, the repeated attempts to span the Atlantic and the Pacific, the record breaking endurance flights, the air mail, scheduled air passenger transportation, round the world flight of the Graf Zeppelin, and kindred publicity activities until the public is today actually demanding air services.

Daniel Guggenheim, founder of the Guggenheim Foundation for the Promotion of Aeronautics, said in a recent article,[1] "We have heard much about 'airmindedness' in the past year. This state of mind now appears to be an accomplished fact."

This awakened public interest is best evidenced by the great growth in the production and sale of airplanes, and the resulting extension of passenger, mail, and express services. Up to 1925, almost

1. This article appeared in the Kansas City Star in October, 1929.

the entire airplane production consisted of military planes and even in that year the military production accounted for seventy per cent of the total production; but in 1927 this percentage had declined to thirty-three per cent and in 1928 to less than twenty-five per cent. When accurate statistics shall be available for the 1929 production, there will no doubt still be some decline in the proportion of military units to units for civil use.

Table I, presented below, shows the rapid development which resulted from the awakened public interest. It should also be noted that this development resulted under private management and without direct government subsidy.

Table I

Development of Civil Aviation in the United States

Facilities and operations	Year Ending December 31			
	1926	1927	1928	1929[1]
Production of airplanes	1,186	1,995	4,346	6,000
Approved type airplanes		21	96	271[2]
Approved type engines			13	32
Airplane licenses			5,200	6,482
Pilots' licenses			4,887	9,279[2]
Flying schools	175	375	475	575
Municipal airports		240	412	458
Commercial and private airports		263	391	410
Mileage of lighted airways	2,041	4,468	6,988	12,500
Total airway mileage	8,404	9,122	16,667	30,000
Passengers carried on transport lines	5,782	8,679	49,713	85,000
Poundage of mail carried (1,000 pounds)	810	1,654	4,063	8,000
Scheduled miles flown (1,000)	4,318	5,870	10,673	16,000
Planes in transport service	69	128	268	400[3]
Transport operators	14	19	37	45
Mileage of miscellaneous flying[1] (1,000)	18,000	30,000	60,000	125,000

1. Estimates furnished by Major Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.
2. As of December 2, 1929. Reported by Department of Commerce and published in Airway Age for January, 1930, page 38.
3. For the fiscal year ending June 30, 1929. No later data available.

Paralleling this remarkable growth in the production and service fields was the great increase in the price of aviation securities. Before Colonel Lindbergh's flight, the stock of the Wright Company sold at 25. In 1928 it rose from 69 to 289, and in the same period that of Curtiss rose from 53 to 192¾.[1]

E. E. Norquist, president of the Butler Aircraft Company of Kansas City, says of the growth of the industry: "Two and one half years ago you could have bought control in the five leading airplane and aircraft engine plants for ten or twelve million dollars. Today you couldn't touch control at any price. Within the past three years more than one hundred fifty million dollars has been put into the industry. And these figures are only estimates. They'll be much larger tomorrow. The air age has come upon us. Aviation is no longer box-kite flying, a game, a stunt, or an exhibition. It is a great industry -- the most revolutionary of the world."

E. Aviation Development in Kansas City

The history of aviation in Kansas City dates back to about 1919 for there was no aeronautical activity until after the World War. An occasional plane visited the city, but there was scarcely enough activity to even be considered a nucleus of the present day industry.

After the War, several army pilots returned to the city and with a few of the old war planes began flying operations in a small way. Among these pioneers of the industry were: John K. LaGrone,

1. Golden Book, June, 1928, page 54.

Verne Hyde, Beeler Blevins, Blaine M. Tuxhorn, R. Montgomery, Ben Gregory, and James M. Coburn.

John K. LaGrone, internationally known as "Tex" LaGrone, came to Kansas City in 1919 in one of the old war-time training machines. He had started his flying career in California in 1911 and had served as an Army instructor from 1916 to 1919. Mr. LaGrone brought a wealth of aviation experience to Kansas City, and has since been actively affiliated with the industry in this center.

Another man, Dr. John H. Outland, oftentimes referred to as the "Father of Kansas City's Commercial Aviation", purchased a Standard airplane, powered with a war-time Hisso engine in 1920. "Tex" LaGrone was employed as the pilot of this plane and to this day a sort of unwritten partnership exists between these pioneers of the industry in Kansas City.[1] To these two men, Kansas City owes much. No history of the aeronautical activitiesof the city would be complete without mention of these "blazers of the air trails".

The first real flying field was in Swope Park in the summer of 1919. A year later the "Old Kelastross Place" at 85th and Holmes Streets was used as a landing field. In 1921, the American Legion field was established in what is now an exclusive residential section of the Country Club district. There were no hangars and no service facilities of any kind at any of these fields.

The first air circus to be seen in Kansas City was held at the American Legion field in 1921.

1. Kansas City Star, July 31, 1929.

Lon Grower, Budd Knapp, James Coburn, and R. Montgomery established a flying circus in the early 20's and used a cleared plot of ground in an area covered with trees and underbrush as a landing field and general headquarters. The planes were tied to fenceposts as there were no buildings of any kind on the field. This field, now known as Fairfax Airport, is reputed to be one of the finest airports in America today.[1]

E. J. Sweeney, in 1925, leased a part of this landing area, then known as Fairfax Field, and started a flying school.[2] The Sweeney school was the first to construct any kind of building on the field. The two buildings then constructed are still in use at the new airport.

Although these early activities may seem relatively unimportant in comparison with the aeronautical activity that is common today, they formed the basis for the substantial growth which has taken place within the past few months, a development which has been so marked that Kansas City now has a definite place on the air map of the United States.

The city is now served by nine transport companies, among which are representatives of the largest companies operating. Two airports, one of which is within one and one half miles of the center of the Kansas City, Missouri, business district, and another less than a mile from Kansas City, Kansas, provide every service and convenience demanded by the air traveler and his equipment. Four airplane factor-

1. Information supplied by J. K. LaGrone.
2. Kansas City Star, July 31, 1929.

ies and one glider factory are now on a production basis; three additional airplane manufacturing companies have been organized and expect to begin production within a few months. Seven flying schools, three welding schools, and one specialized engineering school offer aeronautical instruction in their respective fields. A rental plane service, one of the only two in existence in the world, offers a service unique in the field. Several accessories companies and manufacturers of accessories are operating in conjunction with the other aviation activities of the city. Aerial taxi, mapping, and photography services are provided by the Curtiss-Wright organization and by private operators.

CHAPTER II

KANSAS CITY AS AN AERONAUTICAL CENTER

The remarkable development that has been made in the aeronautical industry in the past three years was indicated in the preceding chapter. Similar development, but perhaps not of such immediate magnitude, has been observed in the other major industries, particularly in those of the railroad and automobile. In each of these, the rapid development made reorganization and readjustment necessary before the industry was established on a basis which could be considered permanent.

Kansas City, as well as a number of other cities in the United States, has made a rapid growth in the number of aeronautical corporations formed and in the increased transportation and production facilities offered by these companies. The development has been so rapid and yet so general in all sections that the cities, in which any appreciable amount of growth has taken place, have adopted such slogans as "The Air Capital", "The Heart of the Aviation Industry", and similar phrases for advertising purposes.[1] That some of these titles are not accurate, perhaps misleading in a few instances, and that a part of the development in these various centers has resulted in over-expansion, can be justifiably concluded.

The aviation industry is so recently developed that no specific economic laws have been formulated for its various details, but

1. Twenty-three cities claimed some such titles in respect to the aviation industry in 1928.

since aviation activity is fundamentally no different from other modern industrial activity engaged in similar functions, those factors which have made for the greatest development in the latter should, at least to a considerable extent, also make for the greatest development in the different phases of aeronautics. It is therefore the purpose of this chapter to analyze those factors which it is believed are essential to the permanency of the aeronautical industry, and to determine, if possible, the relative advantages or disadvantages afforded by Kansas City for the most complete development of the industry. The chapter is divided into two parts, the first devoted to a consideration of the production of aircraft, and the second to flying activities.

A. Factors in Aircraft Production

Many factors must be considered in determining the location of aircraft manufacturing units, but it is believed that the more important of them are: (1) the proximity of the raw materials for use in manufacture, (2) the adequacy of labor and its wages, (3) the supplementary means of transportation, particularly that of the railroad, (4) available factory sites and costs, and (5) climatic conditions.

Distribution of Aircraft Factories. In the early stages of the automobile industry, numerous small manufacturing units were established in all sections of the United States, seemingly little, if any, serious consideration being given to those economic factors which would make for the most efficient production and for the permanency of the industry in the given center. A similar condition has been observed in the radio industry, and the present condition in the man-

ufacture of aircraft indicates that the experience in the automobile and radio industries is being paralleled in aviation.

The number of aircraft manufacturing establishments, the scattered sections in which they are located, and the limited production of many of the establishments are indicated in Table II.[1] Even in this report, the condition is not adequately shown, for the information is incomplete. Eleven factories were reported in Kansas as of June 1, 1929, by the Aeronautical Trade Directory but the below table records only seven. A similar condition was known to exist in Missouri and no doubt existed in other states as well.

1. Table prepared by the United States Department of Labor and published in Monthly Labor Review, August, 1929.

Table II

Comparative Number of Firms Manufacturing Airplanes, with 1928 Production and Employees, June 1, 1929

State	Firms Dec. 31, 1928	Firms June 1, 1929	Number planes manufactured 1928	Employees June 1, 1929
Alabama		1		35
Arkansas	1	1	49	155
California	8	12	141	1,605
Colorado	1	1	342	374
Connecticut		2		85
Delaware	1	1	25	250
Illinois	7	8	297	239
Indiana	1	1	8	29
Iowa	1	1	3	7
Kansas	7	7	858	1,037
Maryland	2	2	103	244
Massachusetts		1		200
Michigan	10	12	200	1,597
Minnesota	1	1	20	50
Missouri	5	7	470	805
Nebraska	2	2	176	240
New Jersey	3	4	7	1,017
New York	13	15	1,020	4,396
Ohio	4	7	821	1,020
Oklahoma	3	4	77	195
Oregon	1	1	1	10
Pennsylvania	2	3	83	529
Rhode Island	1	1	7	14
Texas	1	1	5	5
Washington	1	1	146	1,371
West Virginia	1	2	2	440
Wisconsin	1	2	25	156
Total	78	101	4,886	16,105

The present manufacturing situation then is one of small factories scattered throughout the nation. Although the economic factors making for the most efficient production have not yet been worked out, there is ample justification for the conclusion that many of these factories have been located with little regard for those con-

ditions which have been found essential in the development of other major industries. The principal reason for this situation is no doubt the fact that aviation manufacturing has, to date, been supported almost entirely by local capital.

Source of Materials. The materials used in the manufacture of airplanes and parts come principally from factories located in the eastern section of the United States. Duralumin and steel tubing, wire and sheets are made in Ohio and Pennsylvania; airplane cloth is manufactured in Virginia, New England and New Jersey; engines and parts are manufactured in New Jersey, California, Connecticut and Michigan; rubber tires and hose originate in Akron, Ohio, and Detroit, Michigan; spruce comes principally from Washington; enamels, dopes, instruments and parts are largely manufactured in the East.[1]

Kansas City and the immediate territory surrounding the city supply none of these materials to the industry. Two companies supply dopes, lacquers and paints, but the local airplane manufacturers do not generally use the products of these companies.[2]

Thus, it can be concluded that Kansas City is not advantageously located to the source of materials used in the manufacture of aircraft. However, such a condition is not so serious as might at first be supposed for labor is a more important element in the building of an airplane than the actual material that goes into it.

1. Report of the Merchants Association of New York City. Data verified from Aeronautics Trade Directory and interviews with Kansas City manufacturers.
2. Only one company was found that used these materials to any extent.

Labor in Aircraft Manufacture. Hand labor is used almost exclusively in the present manufacturing methods. Kansas City manufacturers estimate that hand labor accounts for approximately 90 per cent of the total labor used in the construction of an airplane. Some of the processes require skilled labor, but much of the work can be done by a type which might be termed semi-skilled, for the tasks are relatively easily learned.

No labor shortage has been encountered by airplane manufacturing companies in Kansas City. Representatives of the companies are of the general opinion that no shortage will result in the immediate future at least. Practically all of the companies have a surplus of applications for positions of all types. Women are entering the factories, being employed in fabrication work at present.[1] This condition will no doubt still further increase the surplus of labor available in the entire aeronautical industry. One representative has suggested that labor naturally gravitates towards Kansas City because of its central location.

Table III shows the wages for the different types of labor used in the manufacturing processes of aircraft in several aviation centers. This material was prepared at the close of 1927 but slight change has been noticed in wages since that date so that they are

1. Women are reported to be more adept at this work than men. They are now employed in factories in other cities, notably in the Ryan factory at St. Louis.

probably sufficiently accurate for comparative purposes.[1]

Table III

Average Hourly Earnings -- Aircraft Industry, 1927

District	Welders	Assemblymen	Wood workers	Unskilled labor
Buffalo	.80		.75	.45
Detroit	.90	.60	.60	.50
KANSAS CITY	.75	.75	.75	.40
Philadelphia	.90	.80	.95	.45
New York	.90	.80	.80	.45
San Diego	.75	.70	.75	.25
St. Louis	.80			.35
Wichita	.75	.61	.65	.38
Average[2]	.82	.71	.75	.40

A study of this table reveals a favorable wage situation with a consequent low labor cost for the Kansas City manufacturer as compared with those manufacturers of the other aeronautical centers considered in this report.

Open shop conditions prevail throughout Kansas City, eighty-five per cent of the industrial concerns operating on that basis.[3] Industries have been unhampered by strikes, lockouts and other industrial disturbances as is confirmed by the statement, "There have been only seven strikes since 1898, and none since 1921."[4] A slight labor disturbance occurred at the Loose-Wiles plant in September of this year

1. It has been impossible to secure accurate data for the past two years. Of the several agencies written for verification of the above data, three reported no change and one a slight change to lower rates but gave no statistics. The material was originally prepared by the Merchants Association of New York City and published in 1928.
2. Approximate averages. Decimal parts of a cent disregarded.
3. Book of Kansas City Facts, prepared by Kansas City Chamber of Commerce.
4. Book of Kansas City Facts, prepared by Kansas City Chamber of Commerce.

but this was of minor importance. The labor turnover among manufacturers employing more than one hundred employees is reported as four and two-tenths per cent. These facts would indicate a favorable labor situation in the city.

Railroad Transportation Facilities. Transportation is a factor that can partially offset or add to the disadvantage of distance from the source of materials. Railroad transportation facilities are, without question, the most important of all transportation means affecting the aviation industry in Kansas City. The city is now served by thirteen trunk line railroads, with thirty-two subsidiaries. The proposed consolidation plan of the Interstate Commerce Commission is expected to offer additional railroad facilities to the city.

The means for transporting manufactured products from the city are of equal importance. Planes are usually listed at fly-away-factory prices but they are most often crated and shipped by express where the destination is any great distance from the factory. Kansas City has a marked advantage in shipping to the Southwest. A population of fifteen million people is said to be served at lower transportation cost from Kansas City than from any other of the larger cities.[1] However, the city is at a serious rate disadvantage in shipping to the Eastern centers, particularly is it at a competitive disadvantage with Chicago and St. Louis.[2]

1. Industrial Data Handbook.
2. Kansas Citian, July 15, 1929.

It should be noted that this rate disadvantage applies to freight which is perhaps of doubtful importance in the industry under present conditions. On the whole, Kansas City is at least as favorably located as regards adequate transportation facilities as are any of the other aircraft manufacturing centers of the Middle West, with the possible exception of St. Louis.

Factory Sites. Industrial sites are available at prices lower than those of Eastern cities and in most cases lower than those of the Pacific Coast centers. Sites are also available for lease on both Fairfax and Municipal Airports. These sites are closely located to the centers of the business districts of the two cities and are served by railroad terminal facilities. Perhaps in no one of the larger cities of the country are industrial sites for airplane factories located in such close proximity to the business districts.[1]

Climatic Conditions. It is probable that climatic conditions have slight direct effect on aircraft manufacturing. Although Kansas City experiences certain extremes of temperature, modern factory buildings permit continuous manufacturing activity throughout the year. The general weather conditions are such that the testing of completed products can be made in practically any season.

B. Factors Affecting Flying Activities

The conditions affecting the extent of flying activities are not identical with those affecting the manufacture of aircraft, for

1. These conclusions are based on interviews with manufacturers of Kansas City and reports of the Chamber of Commerce.

the two phases of the aeronautical industry, although closely related, are fundamentally different. As in manufacturing, all of the economic factors of air transportation, whether of private or commercial flying, have not been determined, but among those known to be more important are: (1) the topographical and geographical conditions of a territory; (2) the general weather conditions and the facilities for gathering and reporting weather information; (3) the supplementary means of transportation and the development of such facilities; (4) state regulatory restrictions; and (5) the standard of living of the people within the territory.

Topographical and Geographical Conditions. Topographical features largely determine the extent of aeronautical activity in a given territory. Mountains, forests, large bodies of water, and deserts offer real hazards to aviation in its present stage of development. The Great Plains region, in which Kansas City is centrally located, presents as few, if not fewer, of these hazards than does any other great territory in the United States.

A centrally located geographical position would seem to be desirable although a location near the population center might be of more value. Kansas City is the largest city located close to the geographical center of the United States. The fact that the center of population is continuing to move westward means that in time Kansas City will be much closer to that center also. By air from Kansas City, Boston is 16 hours; New York, 14 hours; Chicago, 4 hours; Detroit, 7 hours; Cleveland, 7 hours; Los Angeles, 13 hours; San Francisco,

17 hours; Dallas, 6 hours; and Salt Lake City, 10 hours.[1] Wichita and St. Louis, both important aviation centers, perhaps offer almost similar advantages but with a distance differential of 171 and 274 miles, respectively.

Landing Facilities. Closely connected with the features of the country are the available landing field facilities. On June 30, 1929, the four states which surround Kansas City had 121 airports of which Kansas had 33; Iowa 41; Nebraska 28; and Missouri 19.[2] The density of landing fields to the territory of these states is less than that of approximately a third of the states of the Union. However, this does not necessarily imply that the facilities are more inadequate here than in the other sections. There are few sections in any of these four states in which emergency landings cannot be made and in which passengers would be a dangerous distance from population centers.

Meteorological Conditions. Adverse meteorological conditions present one of the greatest problems of aviation. Improved flying equipment and increased skill of pilots have overcome the weather hazard to a considerable extent, but many meteorological problems are yet to be solved.[3] The National Advisory Committee on Aeronautics reported in 1928 that atmospheric conditions are responsible for more than

1. Schedule furnished by Fairfax Airport officials.
2. As reported by the statistical number of Aviation, October 5, 1929. This number is no doubt lower than the number of landing fields available, for many new ports were established in the early summer months and were not yet listed at the time of the report.
3. Blair, William R., Major U. S. Signal Corps.

one-tenth of the fatalities in aviation.[1] One transport company had 420 forced landings due to adverse weather conditions as compared to 55 from mechanical failure.[2]

There are two chief weather elements which enter into safe and profitable air transportation: visibility and wind.[3] Fog, smoke, and certain cloud formations make up the first danger; tornadoes, anakatobats,[4] and other wind conditions make for the second. Thunderstorms, lightning, and ice formations are other dangers of aerial activity. Information has been gathered and is here presented for the purpose of comparing the meteorological conditions in Kansas City with those in other aeronautical centers:

1. Statement published by Los Angeles Chamber of Commerce, July, 1929.
2. Hinsbury, F. C., Chief Engineer, U. S. Airways Division.
3. Carpenter, Ford A., meteorologist.
4. Up and down rushes of wind.

Table IV

Meteorological Conditions in Three Principal Air Centers of This Territory[1]

Visibility

Condition	Kansas City	Wichita	St. Louis
Clear days	153	167	139
Partly cloudy days	114	116	124
Cloudy days	98	82	102
Dense fogs, days	12	9	9
Sunshine, % of possible	62	67	67

Wind and Storms

Condition	Kansas City	Wichita	St. Louis
Average velocity	10.3	12.4	10.9
Days of 20 m.p.h. or more	120	259	
Days of 40 m.p.h. or more	12	12	20
Maximum recorded	74	88	80
Thunderstorms	50	50.6	47

A study of this material reveals no particular advantage of one of these three cities over the other. Wichita has more wind but this may be partially offset by other such conditions as smoke which is common in the larger industrial centers. These conclusions are also verified by reports of pilots that weather conditions in these three cities are on the average equally favorable.

A similar study has been made of the weather conditinns in three of the large aviation centers in different sections of the United States. This information is pnesented in Table V below:

1. United States Weather Bureau Reports and Airway Bulletins.

Table V

Meteorological Conditions in Three Air Centers of Three Distinct Territories

Visibility

Condition	Chicago	Kansas City	Los Angeles
Clear	119	153	172
Partly cloudy	131	114	137
Cloudy	115	98	56
Dense fog	8	12	29
Sunshine, % of possible	58	62	97

Wind and Storms

Condition	Chicago	Kansas City	Los Angeles
Average velocity	15	10.3	5
Days of 20 m.p.h. or more		120	5
Days of 40 m.p.h. or more	38	12	4
Maximum recorded	84	74	48
Thunderstorms	43	50	3

Study of this table also reveals few differences in so far as meteorological conditions are concerned. It is doubtful if the differences disclosed are great enough to alone determine the location of aeronautical activities. Los Angeles seems to offer the greatest advantage from the "weather" point of view and, therefore, would be more adaptable to flying activity. However, the territory might not be so favorably situated as regards all aeronautical activities, for it is located far from the usual sources of materials and has only one principal direction in which products may go.

Much progress is being made towards making the airplane independent of the weather. A few years ago fog offered one of the greatest hazards of commercial aviation but it is now possible for a pilot to fly "blind" for long distances. The radio directional beam has

demonstrated its usefulness over one of the most treacherous air routes in this country. One of the large transport companies has recently announced a method by which the fog is burned away from an airport so that a safe landing can be made no matter how dense the fog outside of the airport.[1] Surfaced run-ways and other improvements at the better airports have largely overcome the obstacles of snow and rain. Better designed and better stressed planes have lessened the dangers of wind.

Weather Reporting Facilities. "Ultimately the airplane may be independent of atmospheric conditions. For the present, however, safety can only be assured where the pilot can gauge his flights according to the weather which lies ahead of him."[2] The location of weather bureau stations and weather reporting facilities are, therefore, important considerations in determining the desirability of a locality as an aeronautical base.

The United States Department of Commerce has twenty-four radio broadcasting stations located in various parts of the United States and is now constructing fifteen additional stations. Four of these stations now operating are within two hundred miles of Kansas City, Missouri: Station WEK at Wichita, Kansas; Station KCQ at St. Louis, Missouri; and Station KFJ at Omaha, Nebraska. Each of these stations broadcasts the terminal weather from other cities and from its own on the half hour, twenty-four hours a day. The Kansas City station, KRC, broadcasts the weather from Kansas City, Chicago, Wich-

1. Tests made by the American Air Transport Association and reported by the University of Illinois "Enterpriser".
2. First Annual Report of the Guggenheim Fund for the Promotion of Aeronautics.

ita, St. Louis and Omaha. In addition to this service the United States Weather Bureau station is located in Kansas City, Missouri, and a branch of this bureau at Municipal Airport. Transcontinental Air Transport maintains a private weather bureau service at Municipal Airport.

These facilities would indicate that Kansas City is as well provided with means for gathering and reporting weather data as is any center in the country.

Supplementary Means of Transportation. Aerial transport, in the present stage of development, is almost wholly dependent on the other means of transportation for its operation. Facilities for scheduled air transport are usually available only at the larger population centers, making it necessary to transport passengers to the air center from the outlying territory. Airports are most often located several miles from the business and residential centers so that adequate transportation means must be provided from the city to the airport. Thus, the development of the supplementary transportation facilities, which may be considered to include steam railroads, electric lines, bus services, private taxi lines, improved highways and private automobiles, has an important bearing on the extent to which aerial transport can be utilized. The inadequacy of these facilities will seriously handicap aeronautical activity, whether of scheduled air transport or of private flying.

The development of the steam railroads was discussed in the first section of this chapter. That the railroad passenger service is

adequate to supplement aviation transport in Kansas City is shown by the number of air-rail arrangements which have been made through the city. Motor bus and interurban services are provided between Kansas City and the larger population centers of the territory. Street railway and city bus service are well developed in both Kansas City, Kansas, and Kansas City, Missouri, and the bus service will soon be extended to the principal airports, Fairfax and Municipal.[1] Two private companies have been formed for the purpose of supplying auto service to and from the airports in addition to the same type of service offered by the air transport companies for the convenience of their passengers.

The highway systems of both Kansas and Missouri have been extensively developed in the Kansas City territory. The Chamber of Commerce of Kansas City, Missouri, estimates that a half million people are able to reach the city in six hours without leaving the hard surfaced roads.

State Regulatory Restrictions. Aerial navigation presents legal questions of both national and local significance, for the airplane crosses the boundaries of nations and states almost as easily as the automobile or the train crosses county and township lines. The importance of adequate and uniform legislation was early recognized by the European governments and national legislation was effective in all of the world powers, except the United States, by 1924.

Because of the delay in the inauguration of aerial transport and the limited international flying, national legislation did not be-

1. Report of field managers of the airports.

come effective in the United States until the Air Commerce Act was made operative December 31, 1926. With the rapid development of aviation, air legislation became increasingly popular with the state legislatures, and by 1929 commercial aeronautics was regulated by eighty state acts in addition to those of the federal government.

The proposed Uniform State Law for Aeronautics was early drawn, but only thirteen states had adopted its provisions in July, 1929. The result is that the state laws are not uniform and give cause for much dissatisfaction. More attention has seemingly been given to the volume of legislation than to its quality. J. A. Eubank say of the state legislation, "Some of the laws are sound and constructive but many are ill advised, poorly drawn, and of doubtful legality."[1]

The non-uniformity of the state laws and the inefficient administration of them obviously has some immediate unfavorable effect on the development of aeronautical activities in a given territory. A study has, therefore, been made of the air laws of those states immediately surrounding Kansas City in an effort to determine their possible effects on the aeronautical development in the city.

Missouri. Federal licenses are required for all flying except solo pleasure flying.[2] Landing of aircraft on lands or waters of another without his consent is unlawful, except in case of forced landings.[3] The liability of the owner of an aircraft for damage caused by collision in air or on land shall be determined by rules of law applicable to torts on land.[3]

1. Eubank, J. A., member of the New York Bar and writer on aeronautical law. Airway Age, December, 1929, p. 195.
2. Senate Bill 564, approved May 24, 1929.
3. Senate Bill 25, approved June 1, 1929.

Cities, villages, towns and counties are authorized to acquire, construct, improve, maintain and operate, and regulate airports and landing fields, and by franchise or contract authorize others to maintain or operate such landing facilities.[1]

Kansas.[2] All resident operators are required to have state licenses; non-residents, licenses issued by other recognized licensing agencies. All planes used in the state by residents, or for carrying pay passengers by non-residents, must be registered in Kansas. The license fee is $10 and the registration fee $15. No mention is made of liability. All cities of the state may acquire, improve, maintain and regulate municipal airports and municipal fields for aviation purposes, and may levy taxes and issue bonds for the payment thereof.[3]

The initial Kansas aeronautical law was passed in 1921 but no effort has been made to enforce its provisions. A board, for the purpose of enforcement, was provided by the statute, but such a body exists on paper only.

Iowa.[4] Federal licenses are required for all aircraft and airmen. All aircraft operations shall be in accordance with the federal air traffic rules. No mention is made of liability. Cities and towns may acquire, establish, improve, maintain, and operate airports within or without their limits, acquire property for such purposes, and levy taxes and issue bonds for the cost of projects.[5]

1. Senate Bill 476, approved February 19, 1929.
2. State Aeronautical Legislation and Compilation of State Laws, Aeronautical Bulletin No. 18, published by the Aeronautics Branch of the U. S. Department of Commerce.
3. Effective March 16, 1929.
4. Senate File No. 283, effective July 4, 1929.
5. House File No. 311.

Nebraska. Federal licenses are required for all commercial operations. Rules and regulations for aerial navigation are established by the State Railway Commission. No mention is made of liability. Aviation fields may be established, constructed and operated by municipalities of the metropolitan and first and second classes. However, no airport, landing field, or airdrome shall be acquired by any city through the issuance and sale of bonds, or the levy of taxes, until the location and specifications thereof shall have been approved by the Department of Commerce of the United States.[1]

No drastic restrictions appear in the laws of these four states. Federal licenses are required for aircraft and airmen in three of the states thereby coinciding with the federal legislation relating to these matters. In Kansas, where the state licenses are required, the fees are not excessive when compared with those of other states.[2]

The development of airports and landing fields is one of the great needs of commercial aviation today. It would, therefore, seem that those states, in which municipalities are permitted to operate such facilities, would offer favorable inducements to the extension of aeronautical activities. All four of the states in the Kansas City territory authorize cities to acquire and operate airports and to issue bonds and levy taxes for the cost and operation thereof. There are certain statutory requirements as to the choice of the sites for the

1. House Bills 374 and 424, approved April 24, 1929, and effective 90 days later.
2. In Florida the annual fees amount to at least $275 and in Arkansas $25 for private flying and $100 for commercial.

airports and the amount of money to be expended, but these requirements cannot be said to be unfavorably restrictive; rather they seem to provide for the permanency of the improvements.

From this brief summary, the present state legislation in the Kansas City district seems to be relatively satisfactory for the development of aeronautical activities. However, the Kansas law has been found inadequate and it is possible that some change might be necessary. Nebraska is, also, preparing a proposed aircraft statute to supersede the present law. The Missouri law, which is comparatively recent, coincides with the federal statutes and will perhaps need no revision within the next four years at least. The enforcement of the present laws in all of the states is an important problem and one that will require more consideration in the future.

Effect of the Standard of Living on Aeronautical Activities. The chief advantage afforded by air transport is without question the speeding up of transportation with a consequent saving of time. Where a high standard of living does not exist and where time is of little value, air transport cannot have a high degree of development. To the Chinese coolie or the African native, time means little in his ordinary commercial pursuits. An analogy might be drawn with other transportation facilities. The automobile has had its greatest development in those countries where a high standard of living exists and where time is highly valued. A similar condition can be observed in the development of the railroad.

The United States has the highest standard of living of any country in the world. The standard within the Central States compares most favorably with that of any other section of the nation. If the hypothesis above outlined is correct, air transport should have a great development in the United States, and such development should be a substantial one in the section in which Kansas City is located.

Critique of Conditions in the Kansas City Territory. An attempt has been made in this chapter to analyze those factors which make for the greatest development of the aviation industry in any territory. It has been pointed out that Kansas City has the most favorable geographical location of any of the larger cities of the nation; that its topographical features are more conducive to flying than are those of any other great territory; that weather conditions are on the average equal to those of other centers, and that the weather reporting facilities are of the highest type available. The labor situation is especially favorable to manufacturing activity, but the city is located far from the source of materials used in manufacturing aircraft. Air legislation in those states immediately surrounding Kansas City is believed to be generally favorable to the development of aeronautical activities. Transportation facilities are adequate for the most part and plans are now formulated for the improvement of those features which at present are disadvantageous. The standard of living of the people within the territory compares most favorably with that of the standard of the nation, which is representative of the highest type in the world.

Of Kansas City and its territory, Colonel Halsey Dunwoody, Vice-President of the Universal Air Lines, has said, "It is to this part of the nation that the center of pressure of air activities is pushed. In the Southwest is the great potential aviation junction of the continent. The section has particularly ideal atmospheric conditions; its distances are great and railroad transportation has not yet reached the peak it has attained in the East. I look for the most sound and progressive aeronautical development of the country in the Southwest."[1]

1. Reported in Kansas Citian, June 16, 1929.

CHAPTER III

THE MANUFACTURE OF AIRCRAFT

Commercial aeronautical activity can conveniently be divided into four phases: (1) the production of aircraft, engines, parts and supplies, (2) transport operations for the carrying of passengers, freight, express, mail, or all four, (3) instruction in the operation and maintenance of aircraft, and (4) private flying for business or pleasure. This chapter will be concerned with some of the problems of aircraft manufacture and an analysis of the aircraft manufacturing companies in Kansas City.

The production of aircraft is unquestionably the primary phase of the industry, but the extent to which it can be carried depends wholly upon the demands of the associated phases. Some production has been completed for experimental purposes, but the amount is insignificant in comparison with the total. The greater part is the result of the public demand, public to be considered in its widest sense to include aeronautical schools, transport services, and private individuals.

A. The Rapid Expansion of Aircraft Manufacturing and Its Results

Because of the rapid expansion of the aeronautical industry, manufacturers were unable to supply the demand for aircraft. This increasing demand, considered insatiable, caused manufacturers to direct all possible effort towards greater production. The factories, already operating, were expanded, branch factories were established, and

new manufacturing companies were organized in every section of the United States.

This increase in the number and extension of manufacturing establishments brought about a corresponding increase in production, the average rate of increase amounting to 130 per cent annually from 1925 to 1929. A similar increase was recorded the first six months of 1929 when an aggregate business of $38,035,000 was reported in aircraft and engine production as compared with $48,000,000 for the entire preceding year. Since the latter figure includes military production, the gain in commercial production is greater than the comparative totals indicate.[1]

Obviously no industry can continue to more than double its production each year for a very long period. By the close of the first half of 1929, production, of at least the two and three-place planes, had reached and exceeded the demand. The problem of quantity production was replaced by two of more immediate importance, namely, the adjustment of production to the changed conditions of demand, and the sale and distribution of the manufactured product.

Major Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, summed up the general manufacturing situation in the following words: "The rapid expansion which has taken place during the past eighteen months has resulted in numerous new manufacturing units being formed. Some of these unit' initiated activities with comparatively limited means, both as to personnel and finances. Some of

1. Statistics from Aviation, October 5, 1929.

them accorded only secondary consideration to the actual economics of production and marketing, their primary objective having been the immediate production of aircraft of a type for which there was then a popular demand. In consequence, some of the hastily formed organizations are now experiencing more or less serious problems of overproduction."[1]

It is generally conceded that overproduction has resulted in the aeronautical industry, but aviation leaders do not agree as to the extent of such overproduction. Sherman M. Fairchild is reported to have stated that there were between twelve hundred and fifteen hundred planes in the hands of manufacturers and dealers in December, 1929. Russell Nicholas, president of the Nicholas-Beazley Airplane Company, estimates that less than forty per cent of the 1929 production had actually been sold and in the hands of consumers on the same date.[2] These are only estimates but they are made by representative aviation executives and it is believed that they serve to indicate the general condition of overproduction.

Aviation has been developed and operated entirely on speculative capital as few of the companies have realized earnings from operations, particularly has this been true of the manufacturing companies. Because of the highly speculative nature of the industry, the general decline in business conditions during the past year early affected the securities of aviation corporations. The market value of

1. Airway Age, December, 1929, p. 37.
2. Aeronautics, December, 1929, p. 19.

the securities dropped to low levels and it became increasingly difficult to market new issues. Thus, the aircraft manufacturer was confronted by both the problems of overproduction and the difficulty of securing capital to continue operations. The general break in the main securities market a few weeks later made the situation even more acute.

Before the depression came in manufacturing, a "seller's" market prevailed. Production of the majority of companies was contracted a year in advance. No serious sales effort had been made for such had not been necessary, but the new conditions demanded complete selling organizations, advertising campaigns, plans for insurance and the sale of planes on an installment basis. The manufacturer was totally unprepared for such changes. There were few airplane salesmen for salesmen were usually not pilots and pilots were often not salesmen. A complete organization had to be formed and personnel trained for the new demands.

The manufacturer was fortunate in being able to utilize certain of the distribution mediums and the selling methods employed in the automobile field, but all of these were not adaptable to the aviation field. The Kansas City manufacturers are attacking the sales problem through a kind of "cut and try" process and have adopted no definite plans as yet.

B. Kansas City Manufacturers

Four airplane factories and one glider factory are now on a production basis in Kansas City. Of the airplane factories, three are

located at Fairfax Airport in Kansas City, Kansas, and one at Municipal Airport in Kansas City, Missouri. The Cook Glider factory has temporary quarters in Kansas City, Missouri. Four additional airplane companies have been organized in the cities and are now carrying on experimental work expecting to get into production as soon as conditions warrant.

American Eagle Aircraft Company. The American Eagle company is one of the pioneers of the aviation industry in Kansas City. The present manufacturing company, with its affiliated industries, is the direct outgrowth of the Porterfield Flying School which was established in 1925.

The Porterfield Aviation Interests, a holding company, was incorporated in May, 1929, and now has the following affiliated companies: American Eagle Aircraft Corporation of Delaware; American Eagle of Texas; American Eagle of California; American Eagle of Minnesota; Wallace Aircraft Company; American Eagle of Missouri; American Eagle of Kansas, and Porterfield Flying School.

The Wallace Aircraft Company of Chicago was acquired by the Porterfield Aviation Interests July 15, 1929, at a reported cost of $250,000.[1] The Wallace factory was moved to Kansas City, and the "Wallace Touroplane" is now built in the American Eagle factory under approved type certificate Number 119.

1. Associated Press item in Kansas City Star of July 15, 1929. Also reported in Kansas Cŏtian of July, 1929. Mr. Porterfield, president of the Porterfield Interests, has never verified the exact purchase price.

The company owns a five-acre tract of land adjoining Fairfax Airport and has constructed five buildings on this plot: a two-story fireproof brick and concrete administration building, a main factory building, two metal buildings and an engineering building. The present factory building is the fourth used by the company since it was launched. The first had less than 1600 square feet of floor space, the second 2400 square feet, the third 16,000 square feet, and the present more than 50,000 square feet. This increasing demand for greater factory space indicates the growth of the company.

The factory is organized so that line-production methods are utilized. Progress of construction in the main factory building is from south to north, the raw materials going in at one end and the finished airplane coming out at the other, where it may be taxied to the airport and flown away or loaded onto freight or express cars on a siding adjoining the factory on the west.

In the southwest corner of the factory building is the stockroom, which occupies approximately a sixth of the floor space. A perpetual inventory system enables the stockroom director to know at all times what is on hand and what is needed. Opposite the stockroom on the east side of the building is the welding department, in which fuselages are assembled and welded. Adjoining the welding department, on the north, is the metal working department where all of the sheet metal used in the building of the airplane is prepared. Opposite this is the motor department. At the north end of the building and on the west side is the wing department where more than a score of wing

tables are in operation, skilled builders constructing ribs and assembling spars and completing the structures for the coverings which are applied in one of the metal buildings and then doped in the same structure. Painting is done in the north metal building and the finished wings are racked in storage. The northeast sixth of the main building is used by the assembly department, and it is here that the planes are assembled and completed.[1]

The American Eagle line of planes consists of six open cockpit biplanes, in addition to the Wallace. Two new models are now being developed and will be announced early in 1930.

A branch has been opened at Dallas, Texas, and plans have been completed for the opening of six other such units throughout the United States so that service and sales calls can be answered at practically any point within a few hours after receipt of the call.

Sales are handled through a distributor-dealer organization. At the close of the fiscal year, December 31, 1929, four hundred dealers and distributors had been appointed to handle the sale of the company's products.[2] Exclusive territories are not assigned to any of these representatives. All advertising is taken care of by the main office at Kansas City. Sales paper on planes sold under the finance plan is handled through the U. S. A. C. of Philadelphia.

The company had two hundred persons on the payroll at the close of 1929. This number will be considerably increased when the

1. Aero Digest, November, 1929.
2. The materials presented in this analysis are taken from Aero Digest, Aviation, Kansas Citian, letters, and interviews with company officials.

season becomes more adaptable to aviation activity. Six hundred planes had been manufactured by the American Eagle Company to December 31, 1929.[1]

Butler Aircraft Company.[2] The Butler Aircraft Company was formed in 1928 by the principal stockholders of the Butler Manufacturing Company for the purpose of building several types of airplanes. The company has constructed eight buildings on land leased from the Municipal Airport. These buildings house the general administrative offices, engineering offices, fuselage, experimental and woodworking shops, final assembly and paint and dope shops. Approximately $250,000 has been expended in the organization and construction program of the company. Present capacity and facilities will permit the production of one plane a day.

A three-place open biplane, called the "Butler Blackhawk", was the first to be built. This plane, manufactured under approved type certificate Number 135, is listed at $8,000 at the factory. Eleven planes of this type had been built to December 15, 1929. A two-place training plane is now under construction.

Forty persons were on the payroll of the aircraft company in December. The personnel of the company is composed of well known aviation men. Waverly M. Stearman was co-designer of the first plane to be built for commercial sale. M. C. Bauman, chief of the engineer-

1. Smith, Erle P., publicity director of the American Eagle Company.
2. The information concerning this company is taken from prospectus furnished by the company, the Kansas Citian, and material gathered in personal interviews with Mr. Briney, director of sales, and Mr. Hamel of the engineering staff.

ing division, was formerly associated with Orville Wright in the Dayton-Wright Company. Lieutenant Wilton M. Briney, director of sales, is an ex-Army flier with twelve years of experience in the aviation industry.

The marketing plans of the company have not been completed. Sales will be either direct by the factory representatives or through a limited number of "strong" distributors.

Inland Aviation Company. Dewey Bonebrake, nationally recognized authority on airplane design, planned and built the "Inland Sport" plane more than two years ago and made a test flight with it in July, 1928. Mr. Arthur Hardgrave, at that time president of the Kansas City, Missouri, Chamber of Commerce, aided in the financing of the new plane and, with others, was instrumental in organizing the Inland Aviation Company as a Missouri corporation August 4, 1928.

This plane, powered with a LeBlond "60" motor, was thoroughly tested in a number of air meets and cross country flights. On September 30, 1929, it set a new official American altitude record for planes in its class and on November 3, 1929, set the world's speed record in the same class.[1] The plane is manufactured under approved type certificate Number 259 and is listed at $3485 fly-away factory. Production was started in April, 1929, and eleven planes have been built to date.[2]

Another plane, the "Inland Super-Sport", powered with a Warner Scarab engine, has been designed but has not yet received an

1. Kansas Citian, November, 1929.
2. A letter from Mr. Arthur Hardgrave, president of the Inland Aviation Company. The other material has been taken from literature of the company, Aircraft Age and Kansas Citian.

approved type certificate.[1] This plane, powered with the larger engine, is listed at $5975 factory. Two of these planes had been manufactured to December 10, 1929.

Both of these products are two-place, side-by-side, high wing monoplanes. They are claimed to operate at a low cost and although known as "sport jobs" are especially adapted for the private owner, the traveling salesman, and for training purposes.

The company is now occupying one half of the Beacon Airways Building at Fairfax Airport. About fifty persons were on the payroll in December, 1929.

A "strong distributor" organization is planned, that is, all distributors of Inland products must meet certain financial standards and must contract for a given number of planes in addition to offering aircraft service facilities. Schlee-Brock of Detroit, the first distributor to be appointed, holds exclusive sales rights in five of the North Central states.[2]

Kansas City Aircraft Corporation. The Kansas City Aircraft Company was organized by a group of local Kansas City business men for the purpose of building a commercial airplane. Hugh L. Thompson of the United States Engineering School, has designed a two-seated monoplane powered with a Velie motor for the company. One plane of this type has been built and another will be built within the next few months.

Although not on a production basis, the company has purchased

1. Mr. Hardgrave reports that the company expects to receive one in the near future.
2. Moore, Wilfred G., director of sales.

a five-acre tract of land south of Fairfax Airport and plans to construct a building costing $130,000. The first ship was built at the Parker Fan Works factory.[1]

Mercury Aircraft Company. The Mercury Aircraft Company, a Delaware corporation with a closed stock issue, is building a six-place cabin ship in one of the buildings at Fairfax Airport. The present work is concerned with the making of jigs and other preparations for the production of the new type plane built around a Wasp engine.[2] Company officials are attempting to keep all plans secret so that it is difficult to secure information.

Rearwin Airplanes, Inc. The Rearwin Airplane corporation had its inception in Salina, Kansas, where Mr. R. A. Rearwin, with the assistance of Fred Landgraff of the Travel Air Company, built the first plane in 1928. This was a three-place biplane built around a Curtiss Challenger engine, and was given the name "Rearwin Ken-Royce". The plane, manufactured under approved type certificate Number 232, is largely a custom built plane for the use of the private owner and the individual commercial operator. The first "Ken-Royce" was a "fast" plane, having won 51 race victories in the All-Kansas Air Tour and first place in the 1800 mile race, Miami to Cleveland, a feature of the National Air Races.

The Rearwin Company is on a production basis in its own

1. Information supplied by Hugh L. Thompson, designer of the plane; also from the Kansas Citian, December 12, 1929.
2. Interview with engineer in charge of the factory.

building at Fairfax Airport.[1] Only half of the building is at present utilized by the Rearwin factory, the other half being leased to the Inland Aviation Company. The maximum capacity of the factory is four planes a week.[2] Forty-two employees are on the payroll of the company in the summer months but in the winter this is cut to fifteen or twenty. Mr. Rearwin announces that production on a larger scale will begin early in the spring of 1930.[3] Five planes had been manufactured to December 31, 1929.[4]

Standard Steel Works. The Standard Steel Works company of North Kansas City, Missouri, is building an all metal eight-place cabin plane. This ship is so built that it can be powered with any one of three motors: a 450 h.p. Pratt-Whitney "Wasp", 525 h.p. Pratt-Whitney "Hornet", or a 550 h.p. Wright "Cyclone". The company plans to get an approved type certificate for the plane and start on a production basis shortly after the first of the year 1930.[5]

Superior Aircraft Company. A plane claimed to be of unusual design has been reported by the Superior Aircraft Company. The plane, a monoplane with full cantilever wing and powered with a Warner-Scarab engine, is being built in the Air Service, Incorporated shops at 2525 Pennway.[6] The shops and offices were closed at the time of

1. This building was constructed by National Air Industries, Inc., but has reverted to A. R. Jones, an equal shareholder with Mr. Rearwin in the Rearwin Company.
2. Interview with Mr. Gillespie of the company.
3. Kansas Citian, December 17, 1929.
4. Information supplied by Mr. Smith, director of sales.
5. Walton, Phil G., president of the corporation, and Kansas Citian, September, 1929.
6. Kansas City Star, November 14, 1929; Aircraft Age, September, 1929.

this survey so that it was impossible to secure further information concerning the company or its proposed plans.

B. Gliding and the Manufacture of Gliders

The Germans have developed the art of gliding to a high degree of perfection, but the Americans have taken little interest in this phase of the aeronautical industry until the past few months. It is claimed that experience in gliding gives valuable training in the handling of the powered plane and shortens the time required in learning to pilot the latter type of aircraft, but gliding is still considered a sport in this country. That this type of flying is becoming increasingly popular is shown by the number of glider clubs which have recently been formed in colleges and universities and the larger cities.

Cook Glider and Soarplane Company. Clarence N. Cook organized the Cook Glider and Soarplane Company in Kansas City during the summer of 1929 for the purpose of building gliders and operating a glider school. This company was one of the four glider manufacturing establishments in the United States at the close of 1929.

Two types of gliders are built by the company: (1) a primary training ship, with a wing spread of 35 feet of the parasol type, and open bridge fuselage, and (2) a sport glider, with covered fuselage. The factory is now temporarily located in Kansas City, Missouri. Ten gliders had been built to January 1, 1930.

CHAPTER IV

AIRPORTS

The problems of achieving safety in transportation and of providing facilities essential to the realization of the greatest benefits from the development of transportation are not new problems. They have faced man down through the ages -- from the time when he built his first ox-cart and found it necessary to widen his footpaths into roads.[1]

When the airplane came into prominence as a means of transportation, it was regarded as a vehicle requiring no investment in a permanent way. The canal boat had required an expensive and inflexible channel; the locomotive's path was less costly but more adaptable; the automobile demanded even less, but it was found necessary to build and maintain an expensive system of highways for it.[2]

A. Need for an Airway

The modern highway of the air must have a series of airports, with intermediate landing fields for emergency purposes and with the necessary equipment for night travel. It is true that the airplane can operate without these facilities; it is also true that an automobile can run on broken ground; a steamship can travel over the water ways without certain navigation aids, but none of these can operate efficiently and safely under such conditions. Therefore, if the air-

1. Blee, Harry H., Chief of the Airport Section, Department of Commerce.
2. Murray, Mathew S., Kansas Citian, June 25, 1929.

plane is to take its position in the transportation system, it must also have a modern "airway" over which to operate.

The nucleus of such an "airway" can be said to be the airport; this, the Air Commerce Act of 1926 defines as "a locality, either of water or land, which is adapted for the landing and taking off of aircraft, and which provides facilities for shelter, supply and repair of aircraft; or a place used regularly for receiving or discharging passengers or cargo by air."

B. Development of Airports

Prior to the passange of the Air Commerce Act in 1926, only a few more than one hundred airports were in operation in the United States but eighteen months later 1047 airports, intermediate fields, and auxiliary fields were officially recorded. In order to indicate the rapidity of airport and landing field development, Table VI is presented.[1]

Table VI

Development of Airports and Landing Fields in the United States

Type of facility	Number of such facilities as of					
	Dec. 31 1927	Dec. 31 1928	Feb. 28 1929	June 30 1929	Nov. 4 1929	Jan. 4 1930
Municipal airports	240	412	425	445	446	453
Commercial airports	263	391	415	456	470	495
Department of Commerce airports	145		311	265	276	285
Army airdromes	62	64	63	69	68	68
Naval air stations	17	17	17	14	14	14
Marked auxiliary fields	320	340	340	259	250	235
Miscellaneous government fields				2	2	2
Total	1047	1214	1571	1510	1527	1552

1. Totals for the periods taken from Domestic Air News and Air Commerce Bulletin.

With the extension of air routes, cities reached out for a place on such lines in much the same way as they struggled for railroads in the past century. To be on one of the airways, an airport, with more or less equipment, was required. These early facilities were not often profit-making enterprises and private capital was seldom available. Therefore, municipalities most often furnished the money for purchase or lease of land, and for construction and maintenance of equipment, such expenditures usually being financed by bond issues. In some communities, public spirited citizens or civic organizations donated land for the airport, or furnished certain equipment for the improvement of the airport.

In other cases, however, the voters failed to follow the lead of some of the aeronautical enthusiasts, and voted down the proposed bond issues. Where this resulted, a holding company was formed to finance the airport until such a time as the bond issue might carry and the city assume ownership. The holding company then leased the airport to the city at a nominal sum, with the understanding that the city would later purchase the airport. Thus, the early airport was not considered a profit-making enterprise, but rather as one in need of a subsidy.

The extension of scheduled air transport and the development of all types of miscellaneous flying resulted in greater use of the airport and its facilities. The rapidly increasing business brought about the realization of profits and private capital entered the airport phase of the aeronautical industry in competition with community

ownership and operation. The transition from the subsidized airport to the commercial is readily ascertained by reference to Table IV. It should be noted that only 28 municipal airports have been established in the past eleven months of 1929 as against 80 of the privately owned type.

C. Kansas City Airports

Kansas City now has three airports, two of which, Municipal and Fairfax, are adequately equipped to provide practically every service demanded by the air traveler. The other, Commercial Airways Field, provides limited services but has no lighting facilities for night flying. It does, however, have an advantage in its location away from the fog and smoke which is more or less common at the other airports. A landing field is also located in North Kansas City but no information is available concerning the operator of the field. Pilots report that it is unsafe for use; therefore, it is omitted from this study.

Fairfax Airport. Three great industrial developments have been made in Kansas City by the Woods Brothers Corporation in the past year. The latest of these, and perhaps the most important of all, is Fairfax Airport, estimated to be a three million dollar project in addition to permanent improvements made by companies operating at the airport.[1]

Fairfax Airports, Incorporated was organized under the laws of the State of Delaware in 1929 for the purpose of acquiring the

1. Kansas Citian, June 25, 1929.

assets of the Fairfax Airport Company of Kansas. The company's charter provides that in addition to the operation of the Fairfax Airport and auxiliary ports, it may engage in all forms of flying activities, including transport lines for carrying passengers, freight, and express.

The company has an authorized capitalization of 200,000 shares no par common stock, of which 60,000 shares were issued in exchange for the assets of the Fairfax Airport Company. Through Woods, Faulkner and Company were offered 160,000 shares at $15 per share in September of this year. There are 20,000 shares still unissued, but under option to the underwriters for a period of two years at the offering price.[1]

In addition to the main terminal, Fairfax, the company owns and operates five landing fields or ports near Kansas City: Atchison Airport at Atchison, Kansas, and the following fields in Missouri, Weston Airport at Weston, Farley Field at Farley, Parkville Port at Parkville, and Rosecrans Field at St. Joseph. These auxiliary ports are used for student instruction, thus relieving the main airport of congestion.

The question as to who first used the present site of Fairfax Airport as a landing field has not been definitely settled. Ben Gregory was without doubt the first to carry passengers from the tract and James M. Colburn used the field for some early experiments with his airplane loud speaker. Tommy O'Laughlin's forced landing is generally

1. Information from printed letter of Guy E. Standley, president of Fairfax Airport.

considered to be one of the first, if not the first landing, on the field. It is generally agreed, however, that the field was used by all of these men shortly after the American Legion air meet of 1921.[1]

E. J. Sweeney started a flying school on the site of the present airport in 1925. The Sweeney school, operating under a lease, was the first to construct buildings on Fairfax Field, the name by which it was known at that time. Various commercial aviation companies moved their activities to Fairfax but little permanent improvement was made until the airport was taken over by Woods Brothers Corporation in 1928 and when the American Eagle Aircraft Company established its factory on adjoining land.

The airport is located on the west side of the Missouri River, one half mile northeast of Kansas City, Kansas, and one mile north and across the Missouri River from the Municipal Airport. It can be reached by automobile in twenty minutes from the business section of Kansas City, Missouri, and in five minutes from Kansas City, Kansas. A new highway, now under construction, will make the airport more accessible than at present.

When completed, the airport will consist of approximately 880 acres of level land free from hazards.[2] All telephone, telegraph, and electric wires have been laid underground for some distances back from the port. The Missouri River forms a natural defense against

1. Kansas City Star, July 31, 1929, Special Aviation number, and conversations with Kansas City aviation men.
2. The Goose Island property will be added to the present field within the next two years according to a report of Kansas City, Kansas, Chamber of Commerce.

hazards from the north and east sides.[1]

Eleven buildings have been constructed on the airport and are now occupied. The Curtiss-Wright Flying Service has a repair depot and sales and school building; Universal Aviation Corporation a hangar, air line and school offices; American Eagle Aircraft Corporation a factory, hangar and two metal buildings for dope and wing work; Saunders Fly-It-Yourself Service, a sales hangar and office; National Air Industries a factory, now occupied by the Rearwin Airplanes Company and the Inland Aviation Corporation; Fairfax Airport Company, temporary field offices and transient hangar. The airport officials have specified symmetry and harmony in all buildings to be constructed on the airport and permit the construction only of buildings of a permanent type and of an approved architectural design. Some of the earlier buildings do not conform to these requirements and will be replaced in the near future.[2]

More than $15,000 has been spent for the lighting and signal equipment of Fairfax. Lights are maintained on all buildings and white boundary lights surround the field. Three flood lights are used for night flying. The eight million candle power beacon, placed on the sales hangar, rotates six times a minute. A directional searchlight, to concentrate an intense light on any part of the field, is to be installed to supplement the beacon. A ceiling projector, height indicator, and a cone lighting arrangement are planned. A loudspeaker,

1. Aircraft Age, August, 1929.
2. Information supplied by Franklin Moore, then manager of Fairfax Airport.

operated from the temporary administration offices, with three amplifiers, is also a part of the equipment.

Practically every service demanded by aviation personnel and equipment is available at Fairfax Airport. Sales, repairs and service are offered by the Curtiss-Wright and Universal organizations; storage at the transient hangar; flying instruction by Curtiss-Wright, Universal, Porterfield Interests, and private flying clubs; rental plane service by the Saunders System; aerial taxi and sightseeing by Curtiss-Wright and private operators; passenger and mail services by Universal and its subsidiaries, Central Air Lines and Robertson Aviation Corporation.

Municipal Airport. The inauguration of air mail service through Kansas City and the great growth in commercial aviation brought the need for a municipal airport. Members of the United States Army Reserve Corps and some of the airminded business men of the city therefore began an active campaign for the realization of such a project. A committee of twenty was accordingly appointed for the purpose of investigating all available sites. An extensive survey was financed by the Department of Commerce and made by the Army Reserve Corps, as a result of which the present site of Municipal Airport was selected.[1]

The site chosen was not the level, well-developed field which the visitor views today. Much of the land was covered by heavy timber and underbrush; other parts were swampy; in fact, one of the members

1. It should be noted that this survey has been accepted by the Department of Commerce for all airport surveys.

of the committee reports that the first trip made to investigate the site was made in a row boat.

After the site had been chosen and the survey made, a proposed bond issue of one million dollars was submitted to the voters for the purchase and development of the tract of land by the city. This bond issue failed to receive the sanction of the electorate, but when re-submitted in August of the same year it was carried by a large majority.

St. Louis had planned a similar program and had voted a bond issue at about the same time as Kansas City. In both cities the sites chosen were outside the corporate limits and the validity of such bond issues was questionable. The first court decision declared such an issue to be unconstitutional but this was set aside by the Supreme Court of Missouri in a later case, and plans then went forward for the completion of the projects in both cities. Kansas City completed the negotiations for the land on January 29, 1929, but the litigation attacking the validity of the bond issue and the severe winter weather deferred the development of the port until early summer. Ground was broken for the airport on Saturday, June 22, 1929, and the development of the port has proceeded rapidly to the present date.

Municipal Airport is located one and four tenths miles from the Kansas City, Missouri, post office and about one and one half miles from the center of the business district, giving Kansas City the most centrally located airport of any of the larger cities in the United States. However, the advantages afforded by the accessibility

and convenience of the port may be partially offset by the fog and smoke conditions. The close proximity to the industrial district and the Missouri River makes these conditions particularly acute at certain times of the year.

Municipal Airport now contains 687 acres, the larger portion of the field being well drained and developed. Four runways are now in use and two more are to be completed later. These runways, 11,000 feet in length, are of sufficient width to permit double directional use. They are made of cinders with an application of oil and asphalt. A cement taxi way, 2,000 feet long, has been constructed, as well as cement aprons to hangars.

Approximately $25,000 has been spent for lighting and signal equipment, which consists of boundary lights, approach lights, obstacle lights on certain obstructions[1] near the port, a beacon of 2,000,000 candlepower, one carbon flood light of 500,000,000 candlepower, and three lighted wind cone indicators. The identification beacon, revolving six times a minute, can flash either Morse code or letters, but at the present time only the letters are flashed. Among other equipment is a ceiling projector, an alidade, and neon wind indicator.

The new terminal building erected at a cost in excess of $60,000 is designed to house air line offices, field administration offices, Department of Commerce field offices, and passenger waiting rooms. Telephone and telegraph service are now provided and a

1. Elevator, Kansas City Gas and Independent Oil and Gas Buildings, Fowler and Armour smokestacks, all poles, and bridge.

restaurant is planned in the near future. Two weather stations, the United States Weather Bureau and the Transcontinental Air Transport stations, providing 24 hour service, are located at the airport. Two radio stations, one of short wave length, operate from the field. Repairs, dope, engine and plane repair service, oil and gas, water, air, engine mounts, compass and compass platform are facilities available at the terminal. An ambulance and a resident physician are in attendance at the field.

Kansas City has invested $1,600,000 in the airport to date, of which $800,000 was used in the purchase of the land. Transcontinental Air Transport, Southwest Air Fast Express, Western Air Express, National Air Transport, United States Airways, and Mid-Continent Air Express are now operating air transport services from Municipal Airport. Three flying schools, Bennett Airways, Art Goebel School of Flying, and the Tuxhorn Flying School now use the airport as a base of operations. Other organizations operating at the airport are: Butler Manufacturing Company, manufacturers of the Butler "Blackhawk" airplanes, the Bredouw-Hilliard Aeromotive Corporation, sales and service, and the United States Aero Reserve Corps. A weekly average of two thousand landings is reported by the manager of the airport.[1]

Commercial Airways Field. Commercial Airways Field, established in 1921 as Richards Field, is one of the oldest and best known commercial flying fields in the United States. It was first used by private operators as headquarters for the limited flying activities

1. Farley, Roy C., in an interview.

of the time. When the United States Army Reserve Corps was organized, its base was established at the field, and when the air mail came to Kansas City, the mail planes used it as their terminal. With the opening of the Municipal Airport, both the Army unit and National Air Transport moved their bases from Richards Field to the new airport.[1]

Bennett Airways then leased the airport from the Air Terminal Association and used the field for training purposes. In 1928, this lease was taken over by Commercial Airways which continued to operate the field until December 1, 1929, when the company was merged with the Consolidated Air College. The two schools, operating under the name of the latter, have continued the lease and are now using the field for training operations exclusively.

The field is located twelve miles southeast of the business section of Kansas City, Missouri, on United States Highway No. 50. It is rectangular in shape, 2640 feet by 1700 feet, and contains 150 acres. The gradient is rolling with excellent natural drainage. A circle in the center of the field marks the landing area and the runways are outlined.

Commercial Airways Field is at one of the highest points in the vicinity of Kansas City, and therefore does not experience the foggy and smoky conditions that either of the other Kansas City air-

1. The Army unit retained the name of Richards Field when it moved to Municipal Airport, and because of the confusion resulting in the duplication of names, the operators of Richards Field changed its name to Commercial Airways Field.

ports do.[1] It is not so convenient to the city but is readily accessible on Highway Number 50. No lighting equipment is provided at the field. Repair services, for both planes and engines, storage space and telephone communication are available through the Consolidated Air College. Weather data may be obtained from the United States Weather Bureau station in Kansas City, Missouri.

D. An Appraisal of Kansas City Airports

"Nearness to the business center and accessibility to the public are of prime importance in the location of an airport. Local transportation and communication facilities are also important considerations." Thus does Domestic Air News, Number 25, summarize the factors essential to the location of an airport so that the best needs of the community will be served.[2]

Municipal Airport is the most centrally located airport to any of the larger cities of the country; Fairfax is conveniently located in comparison with those of the majority of the cities. From this point of view, Kansas City perhaps as favorably reaches the standards as any city can hope to do. under conditions now prevalent in the aviation industry.

1. January 2, 1930, the air mail pilots were forced to make emergency landings at Commercial Airways Field because the visibility made landing at either of the other airports impossible. In at least two cases, the writer has observed similar conditions at the different airports.
2. It is of course understood that other factors, such as those offering hazards are of more importance than these two.

Telegraph and telephone facilities are available for use of the public at both airports. Radio and teletype services are used by the transport companies. Transportation facilities are now available but regular bus or street car service is not yet provided.[1]

The convenience of location of these airports is partially offset by certain hazards. Municipal Airport is exceedingly close to a large population center; trees, telephone and telegraph lines on the east, and a bridge on the southeast, offer certain hazards. Both airports are located in the river bottoms where fog conditions are the worst in the territory. The industrial district is almost directly south of both fields, therefore presenting a smoke hazard which is serious at certain seasons of the year. This condition is aggravated by the prevailing wind direction being south nine months of the year, southeast one month, and southwest one month. In February, the prevailing winds are reported from the northwest, but aeronautical activity is usually limited at this season of the year.[2]

1. Officials of the airports report that bus service will be regularly scheduled within a few months.
2. Wind data from the Annual Meteorological Summary for 1928.

CHAPTER V

AIR TRANSPORT

The relationships between the various phases of the aeronautical industry are so interwoven that it is impossible to determine which of the phases is of greatest importance. The extent to which any one of them can be developed depends on the extent to which the other phases have been developed. Each forms an integral part of the whole, yet is supplementary to the other, but the transportation by air of passengers, mail, expresses, and freight is the final goal towards which all aeronautical activity is directed.

A. Historical Development of Air Transport

Although air transport is the ultimate goal of man's aeronautical desire, such a service has been slow in development. The first airplane flight was made in 1903 but fourteen years elapsed before the first scheduled transport line was announced. This line, established by the United States Army, was exclusively an air mail line operating between Washington, D. C. and New York City. In 1922, Western Air Express inaugurated the first passenger air transport line, that between Los Angeles and Catalina Island. Three years passed before other transport lines were established in the United States.[1]

During this period of inactivity on the part of American operators, European lines were extended rapidly under subsidies granted

1. Air Commerce Bulletin, No. 1.

by the central governments, but it is questionable if the expansion under such conditions will be successful in the ultimate. Of the subsidy plan and its effects, Walter P. McCracken, former Assistant Secretary of Commerce for Aeronautics, says, "It has not helped the industry. When first established, its tendency was to stimulate development, as it was designed to do, but that is now past."[1]

In 1926, eight new airlines were established, all of which are in operation today. These lines were National Air Transport, Chicago-Dallas; Robertson Aircraft Company, St. Louis-Chicago; Colonial Airways, New York-Boston; Varney Airlines, Salt Lake City-Pasco, Washington; Pacific Air Transport, Los Angeles-Seattle; Ford Airlines, Detroit-Chicago; two additional lines of Western Air Express, Los Angeles-Salt Lake City and Pueblo-Cheyenne.

Six new lines were inaugurated in 1927: Pan American Airways, Miami-Havana; Ball Transport Company, Pittsburgh-Cleveland; Embry-Riddle, Cincinnati-Chicago; Stout Air Lines, Detroit-Cleveland; Colonial Western Airways, Cleveland-Albany; and an extension of the Ford lines from Detroit to Buffalo.[2]

The extension of air transport lines in 1926 and 1927 resulted in great increases in the number of plane-miles operated and the number of passengers carried, but still greater increases were recorded in 1928 when passenger traffic increased 420 per cent and the

1. Statement made in an address before the Air Traffic Cnnference held at Kansas City in 1929.
2. Data assembled from Air Commerce Bulletin.

number of miles flown 100 per cent.[1] In order to show the trend of air transport development in recent months, Table VII is presented. A study of the data of this table reveals a rapid increase of air transport operations up to November, 1929, when a slight decrease occurred, followed by similar decreases in the subsequent periods. However, it should be noted that the decreases have been relatively insignificant and especially so if cognizance is taken of the seasonal character of air transport and the severe winter conditions which have been experienced during the past few months.

Table VII[2]

Period	Miles of airways	Miles of mail airways	Plane miles scheduled daily
May 30, 1928	11,067	10,058	27,493
July 31, 1928	13,108	12,171	33,317
August 31, 1928	13,133	11,921	32,042
September 30, 1928	13,609	12,397	33,792
October 31, 1928	14,941	12,397	40,602
November 30, 1928	16,486	13,974	38,902
December 31, 1928	16,667	14,155	39,060
January 31, 1929	19,888	14,470	42,698
February 28, 1929	20,788	17,470	53,345
March 31, 1929	21,392	18,074	57,516
April 30, 1929	22,778	19,022	57,453
May 31, 1929	25,336	19,721	62,265
June 30, 1929	29,227	22,165	69,029
July 31, 1929	32,196	24,088	74,970
August 31, 1929	34,366	25,530	78,721
September 30, 1929	35,198	25,735	80,691
October 31, 1929	36,736	26,567	90,909
November 30, 1929	36,957	26,597	90,436
December 31, 1929	36,330	26,597	87,986

1. Young, Major Clarence M., in an address at New York City, November 1, 1929.
2. Aviation, October 5, 1929, for periods to July, 1929. Later statistics from Air Commerce Bulletin.

B. Kansas City Air Transport Services

The air mail service scheduled over the Chicago-Dallas route inaugurated the first transport service through Kansas City in 1926. The city is now served by nine transport companies of which four carry passengers and express, one mail and passengers, three passengers only, and one mail exclusively. These companies and their services are analyzed in the following pages.

National Air Transport. National Air Transport, Inc., was organized in Delaware in 1925 to carry air mail between Chicago and Dallas, Kansas City, Oklahoma City, and other points in the Middle West and South. The first scheduled run was made on this route May 12, 1926, under contract with the Post Office Department. On September 1, 1927, the company began transporting air mail between Chicago and New York, via Cleveland, and inaugurated air express service over all lines under contract with the American Railway Express Company.

Kansas City was located about midway on the Chicago-Dallas route and was therefore selected as the operating center from which all flying activities were to be directed. The ten Curtiss Carrier Pigeon airplanes, purchased for the service, were distributed among the route as follows: four at Kansas City, two each at Chicago and Dallas, and the remaining two at intermediate points. All major overhaul and repair work was also concentrated at Kansas City. The operating personnel, drawn largely from those who had received training in the various federal government services, consisted of fifty-one men, eight of whom were pilots. The daily reports of the United States Weather

Bureau constituted the meteorological services of the company. Communication was handled through the Western Union.

National Air Transport was the first organization of any size to operate commercial routes.[1] Commercial aviation was as yet an experiment and the company was forced to use a kind of "cut and try" process in the operation of the new service. The Curtiss Carrier Pigeons, of 1000 pounds pay load capacity, were found to be too large for the needs of the mail and express services. With an idea of finding the passenger carrying possibilities of the route, eight Travel Air monoplanes, equipped to carry both passengers and mail, were purchased and put into service in August, 1927. These planes were designed to carry 750 pounds of pay load divided between passengers and mail.

In February, 1928, it was apparent that the air mail service on this route could not be of the greatest benefit to business unless it was advanced approximately twelve hours. Under the new schedule, the cities north of Kansas City were afforded little if any service, and an additional daytime schedule was inaugurated between Kansas City and Chicago. The Travel Air planes were replaced by speedier Douglas planes on the night schedule, and the former were used for the new day run. At this time the company had 30 planes in operation flying 6000 miles daily.

When the Chicago-New York route was opened, the office of the operations manager was moved from Kansas City to Chicago. In the fol-

1. The Aviation Industry, Pynchon and Company, p. 105.

lowing summer, the overhaul shops of Kansas City and Cleveland were also moved to Chicago in order to concentrate these services at a central point. It had been found that for greatest efficiency planes should be flown more than 500 miles before taking from the run; therefore, reserve planes only were to be stationed at points outside of the central terminal. The company has acquired real estate and constructed buildings only as such facilities were not to be obtained in the various centers. Three hangars and an office building are owned at Chicago, one hangar each at Cleveland, Ohio, Bellefonte, Pennsylvania, and Kansas City.[1]

No statistics are available for the pounds of air mail unloaded at Kansas City as mail is weighed-in only. The poundage out of Kansas City for the months April to November, inclusive, of 1929, is shown in Table VIII.

Table VIII[2]

Month	Per cent of miles flown on Chicago-Dallas air mail route	Pounds of air mail out of Kansas City
April	90	5,887
May	95	7,166
June	97	6,518
July	99	6,295
August	99	6,623
September	98	6,918
October	90	8,113
November	90	8,316

1. The Kansas City hangar was purchased in November, 1929.
2. Information furnished by Curtis Barkes, auditor of National Air Transport.

Southwest Air Fast Express Way. Southwest Air Fast Express, generally known as the S. A. F. E. Way, was organized by a group of Oklahoma oil men headed by Erle P. Halliburton, in January, 1929. Four tri-motored Ford planes were purchased and the company began operations April 20, 1929, with the opening of four air routes, including the Kansas City-Tulsa division. Six divisions are now operated by the company: (1) Kansas City-Tulsa, (2) St. Louis-Tulsa, (3) Sweetwater-Tulsa, (4) Oklahoma City-Tulsa, (5) Dallas-Tulsa, and (6) Dallas-Ft. Worth and Wichita Falls. Ford tri-motored planes are used exclusively on all routes of the S. A. F. E. Way.

In the first seven months of operation of the Kansas City-Tulsa lines, the planes flew 91,080 miles of the scheduled 93,520 miles, an average of 97 per cent completed trips. In three months of this period, the aircraft completed all scheduled flights, for a 100 per cent average. During the same period passenger traffic showed a steady increase, 223 passengers having been carried in April and 1600 in October.[1]

The S. A. F. E. Way is concerned with the shorter air trips rather than the long distance routes which many aviation men believe to be the only profitable air lines. However, the company has air-rail arrangements with several railroads, one of the most important of which is the Chicago-Los Angeles service via Kansas City, Tulsa, Sweetwater, and El Paso. Another, by which Minneapolis and Galveston are

1. Fleming, Clarence E., general traffic manager of the line.

brought within 37 hours of each other, uses the Chicago-Great Western to Kansas City, plane to Dallas, and Southern Pacific Railroad to Galveston.

Transcontinental Air Transport. Transcontinental Air Transport was organized on May 14, 1928, by the Pennsylvania Railroad and interests prominently identified with the Curtiss Aeroplane and Motor Company, Wright Aeronautical Corporation, National Air Transport and the Atchison, Topeka and Santa Fe Railroad, to inaugurate air and rail transcontinental passenger service.

The company has established passenger transportation by airplane and railroad to complete the journey between New York and Los Angeles in 48 hours. This service, inaugurated July 8, 1929, continues both eastbound and westbound on a daily schedule. The passenger leaves New York on the Pennsylvania Railroad in the evening and arrives at Columbus, Ohio, the next morning. Planes are used between Columbus and Waynoka, Oklahoma, the Santa Fe Railroad from Waynoka to Clovis, New Mexico, and planes from the latter terminal to Los Angeles for the completion of the journey. Thus, the system provides two day service between the coasts, which by the fastest railroad connections requires four days.[1]

The most exacting preparations were made for the opening of the rail-plane service, more than $3,000,000 having been spent in preparing the route and equipping with the necessary facilities. Extensive surveys and investigations were made of several possible routes

1. Aviation Industry, Pynchon and Company, 1929, p. 108.

and a two-week preliminary schedule covering 40,000 miles was flown before the service was formally opened to the public.

Ford tri-motored, 10 passenger, all-metal planes were selected for exclusive use on the airway. Thirty-four pilots were chosen; of these the first pilots average 3000 hours flying experience and 500 hours tri-motored ship experience. The second pilots were all graduates of Kelly Field, the army training school. Complete weather reporting services, consisting of ten weather stations, one of which is located in Kansas City, and seventy-two observation points, were established. These points were connected with each other and with the company's offices by both radio and teletype communication systems.

Kansas City is a station on the line but no terminal facilities are offered at the point except ticket offices and the weather reporting service, which are maintained at Municipal Airport. The personnel at Kansas City consists of five men.

United States Airways. United States Airways is a Delaware corporation formed by Kansas City business men for the purpose of transporting passengers, mail and express by air. A direct route from Kansas City to Denver, through Topeka, Salina, Hoisington, Goodland and Hays was the first of its air lines to be opened. Another line, routed east of Denver through Hays, south to Goodland, Great Bend and Hutchinson, and east again to Wichita, was formed to begin operations December 15, 1929, but regular services are not yet offered on this line.

Three other extensions are planned and are expected to be in operation by March 1, 1930: (1) Wichita to Oklahoma City by way of Enid;

(2) Wichita to Joplin to connect with the Southwest Air Fast Express line at Joplin; and (3) Kansas City to St. Louis by way of Jefferson City.

A schedule has been made by which passengers may use air and rail for transportation between Detroit and Denver by way of Kansas City, in approximately 23 hours. Westbound, the trip is started at Detroit on planes of the Stout Air Lines, at Chicago, the passenger uses the Chicago, Burlington and Quincy Railroad to Kansas City, where the planes of the United States Airways make connections for Denver.

Flamingo 7-passenger airplanes are used on all routes of the company. The planes on the Kansas City-Denver airline had operated at about 22 per cent capacity from the date of inauguration to December 1, 1929.[1] At that time a rate cut of 20 per cent was made effective but no statistics are available as to the increased traffic resulting because of the lower rate. Operations are based at Municipal Airport where hangar and office space is leased.

The route from Denver to Wichita is through a large territory with practically no transportation facilities. No section of the state of Kansas could perhaps more nearly utilize air transport services than could this territory. However, a disadvantage afforded the line is the sparseness of population.

Universal Aviation Corporation. The Universal Aviation Corporation, capitalized at $10,000,000, has recently been acquired by the

1. Knappenberger, J. M., general traffic manager.

Aviation Corporation, one of the four big aviation groups in America. Universal is primarily a transportation company operating in the Middle West but provides other services in some of the larger aviation centers. In addition to the transport services in Kansas City, the company operates a complete airplane repair and sales service, motor repair and overhaul base, and the Porterfield Flying School.

The company owns three United States Government air mail contracts, one of which is the St. Louis-Omaha line through Kansas City, officially known as C. A. M. 28.[1] The original contract provided for a single run daily overthis route, but under a new contract both day and night service was offered on and after September 15, 1929. The mail is carried on this route by the Robertson Aircraft Corporation, a subsidiary of Universal. Mail and passenger services were inaugurated over C. A. M. 28 in the summer of 1929. Six-passenger Super-Universal Fokker planes were first used on the line and are now supplemented by Boeing four-passenger cabin planes. At the present time, mail only is carried on the night run. During the first three months of operations on the St. Louis-Kansas City-Omaha line, 13,782 pounds of mail and 268 passengers were carried.

The Universal Corporation inaugurated transcontinental air-rail service between the East and the West June 15, 1929, in conjunction with the New York Central and Santa Fe Railroads. This line, known commonly as the Great Circle Route, operates through Cleveland, Chi-

1. Contract air mail route. All contract routes are officially designated by numbers preceded by the initials C. A. M.

cago, Kansas City, and Garden City, connecting New York or Boston with Los Angeles and San Diego. The route from Cleveland to Kansas City is a Department of Commerce airline. A weather reporting system between Kansas City and Garden City is operated in conjunction with the United States Weather Bureau. Universal and its subsidiaries furnish direct connection with this transcontinental artery on already established lines to and from St. Louis and between Kansas City, Oklahoma City, Tulsa and otherpoints of the Southwest.

Central Air Lines, a division of Universal offers passenger and express services between Kansas City, Topeka, Wichita, and Tulsa daily, except Sunday. Travel Air 5-passenger cabin planes are standard equipment on this line. Other divisions of the Universal Corporation and the routes which they are operating are: (1) Robertson Aircraft Corporation, St. Louis-Cleveland; (2) Continental Airlines, Cleveland-Akron-Columbus-Cincinnati-Louisville; and (3) Braniff Air Lines, Tulsa-Oklahoma City-Wichita Falls-San Angelo.

The officials of the Universal Aviation Corporation, believing that many aviation accidents are caused by ill health or physical defects of pilots have employed two physicians who devote their full time to examining the personnel of the company. These physicians travel the entire Universal system from Cleveland to Dallas and examine every employee of the company once a month.[1]

Western Air Express. In January, 1929, Western Air Express was reorganized under the name of Western Air Express Corporation, in

1. Aviation, August 31, 1929.

Delaware, through an exchange of stock on the basis of 25 shares of $10 par stock of the latter for each share of $100 par stock of the former company. The new company operates mail and passenger service between Los Angeles and Salt Lake City, Pueblo and Cheyenne, and passenger service between Los Angeles and San Francisco and Los Angeles and Catalina Islands. On June 1, 1929, the company announced the inauguration of the Kansas City-Los Angeles passenger service and on August 6, 1929, express service was instituted over this line.[1]

Western Air Express Corporation is one of the larger and well-financed companies operating in the aviation transport field. It is one of the few companies that has actually made a return on the investment. The president, Harris M. Hanshue, announced that net earnings for the first quarter of 1929 were equivalent to $3.06 per share on the stock outstanding, and for the first 6 months were $5.26 per share. Earnings in 1928 were $168 per share of old stock and $6.73 on the new. Five planes and 20 employees, constituting the initial equipment and personnel, had grown to 39 planes and 212 employees in August, 1929.[2] The flying equipment was estimated at 50 planes and personnel at 400 persons on December 15, 1929.[3] Super tri-motor Fokker airplanes, accommodating 12 passengers, are standard equipment on the Kansas City-Los Angeles airline. Five of the Fokker "F-32" planes, the largest land planes in the United States, have been ordered and

1. Aviation Industry, Pynchon and Company, p. 110.
2. Wichita Magazine, August, 1929.
3. Wood, Thomas, District Passenger Agent at Kansas City.

will be placed in service within a few months.[1]

The inauguration of the Kansas City-Los Angeles air line, June 1, 1929, entitles Western Air Express to credit for the first air-rail line connecting the East and the West. The Kansas City-Los Angeles line, 1417 miles long, is scheduled in 12 hours with intermediate stops at Wichita, Amarillo, Albuquerque and Holbrook. Planes leave both Kansas City and Los Angeles each morning, arriving at the destination approximately 12 hours later. This trip, by fastest rail connections, requires 48 hours. Since the opening of this route, the company has averaged about fifty per cent loads with an on time schedule above ninety per cent.[2]

Western Air Express has no financial affiliations with railroad companies but has working agreements with twenty-one. The 46-hour service between the coasts is provided by contracts with the New York Central, Santa Fe, and Chicago and Alton railroads. A recently announced "hook-up" between Universal and Western Air Express provides an all-air 36-hour service between the East and West. Under this plan, passengers will travel over Universal lines from New York to Kansas City, spend the night in Kansas City, and continue the trip over W. A. E. lines the following day.

The company carries passengers and express on the Kansas City-Los Angeles line, the express service having been inaugurated August 6,

1. Various aviation magazines, verified by Mr. Wood.
2. Wood, Thomas, district passenger agent of Kansas City. The on time schedule is about the same as that of the Santa Fe Railroad.

1929. Express shipments are limited to 200 pounds and to dimensions not exceeding 60 x 19 x 40 inches. Half fares are offered to children between the ages of two and twelve years.

Western Air Express operates from Municipal Airport where one hangar has been purchased and another estimated to cost $75,000 is to be constructed in the near future. Ticket offices are maintained at the Baltimore Hotel and the air terminal building of Municipal Airport.

Mid-Continent Air Express. Western Air Express is affiliated with Mid-Continent Air Express, which operates two airlines at the present time. The first of these, established August 20, 1929, runs from Denver south through Colorado Springs, Pueblo, Albuquerque and El Paso; the other, established November 19, 1929, known as the Kansas City-Denver line, runs from Denver to Pueblo, then branches east through Dodge City, Wichita, and Topeka to Kansas City.

Harris M. Hanshue is president of both Western Air Express and Mid-Continent. The Aero Corporation of California also owns a stock interest in the company. Flying operations are based at Municipal Airport where the company uses all the facilities of the Western Air Express. Flying equipment, Fokker Super-Universal planes, personnel, services aboard planes and to and from airports, are identical to those of the parent company. The morning plane leaves Kansas City at 8:50 arriving in Denver at 3:35 and at El Paso at 5:50 in the afternoon. The plane from Denver leaves that city in the morning and arrives at Kansas City in the afternoon of the same day.

Yellow Cab Airways. Yellow Cab Airways is an Iowa company offering passenger and express services between Kansas City, Des Moines, Mason City, and Minneapolis. In addition to its transport services, the company operates the municipal airport, flight and ground schools, and aerial taxi at Des Moines. Its transport operations are based from Fairfax Airport in Kansas City, Kansas.

The air line was formally opened to the public May 6, 1929, and operations were discontinued November 1 of the same year. Services will be resumed about April 1, 1930, with no change in schedule and with the same equipment, Fairchild cabin monoplanes carrying six passengers, pilot and a limited amount of baggage.[1] Records of the company from June, 1928, to December 1, 1929, show that its planes made 12,733 flights carrying 16,000 passengers a total of 283,511 miles without injury to a single passenger.[2]

C. Present Status of Kansas City Air Transport

In 1929, thirty-two planes, carrying mail, passengers, and express, made scheduled daily trips in and out of the Kansas City airports as compared with eight planes, carrying air mail only, in the year preceding. In 1927, 22,000 pounds of mail were carried in and out of the city; 41,785 pounds in 1928, and 77,900 pounds in 1929.[3] These statistics serve to indicate the rapid expansion of transport services in the city within the past few months.

1. A letter of December 28, 1929, from Russell Reel, president of the company.
2. Ibid.
3. Kansas City Times. January 1, 1930.

CHAPTER VI

AERONAUTICAL INSTRUCTION

The early method of flying instruction was frequently one of a hazardous nature, obsolete and sometimes even dangerous planes being used for instructional purposes. Pilots were of questionable qualifications, in fact, many of them offering their services as instructors knew very little about flying, and even less about how to teach others to fly. Adequate medical examinations were practically unknown outside the governmental services, and all who applied for flying instruction received it regardless of their fitness for the responsibilities of flying.

A. Problems of Flying Instruction

The inevitable result of such methods was the appearance of a number of pilots who, because of physical defects or improper training, with the resultant faulty flying habits, were "unsafe". Accidents mounted in number until aviation was considered as extremely hazardous. Certainly pilots cannot be held responsible for all of the casualties; aircraft engines were little developed, planes were often improperly designed, and in a few cases improperly assembled, but the following passages serve to indicate that the pilot was at fault in the greater number of cases:

"Records of various accident boards indicate that by far the greatest number of accident causes are chargeable to personnel, and that the greatest contributing factor in this category is poor tech-

nique on the part of the pilot. This of course reflects upon the flyer's original training."[1]

A study, covering the past 8 years of United States naval aviation history, shows that the predominant responsibility for crashes rests on the pilot. "Fifty-two per cent of all crashes in this period were attributed to errors of pilots; thirty-one per cent to structural or power plant failures; nine per cent to the condition of the airport; and various smaller proportions to miscellaneous causes."[2] Similar records are not uncommon, some writers even contending that over 80 per cent of present day casualties are due to errors of the pilot. Such reports certainly justify the conclusion that the agencies offering flying instruction should be regulated as regards personnel and equipment and that only those pilots should be permitted to fly who are "physically fit" and have sufficient flying ability.

The Effect of Federal Regulation. The federal government has attempted to make aviation safer in numerous ways, but has accomplished two things in particular in regard to the "pilot" problem. First, strict regulations were adopted regarding the licensing of pilots and aircraft by the Air Commerce Act of 1926, and second, an amendment was made to this act in 1929, providing for the approval of flying schools by the Department of Commerce.

The great progress made recently in raising the standards of flying instruction in this country is without question partly the re-

1. Associated Press report appearing in the Kansas City Star. October 25, 1929.
2. Ibid.

sult of these federal regulations. Such regulations will ultimately prove beneficial to the entire aviation industry, but it does not necessarily follow that the immediate results will be beneficial to the flying school. In fact, such regulations have presented some important problems to the school now operating.

One of the first of these is the limiting of the number of students by the rigid licensing requirements. Another is the advisability of incurring the necessary expenditures to receive the approval of the Department of Commerce.[1] Undoubtedly the school which can advertise as an "approved school" has an advantage over the school that is not approved, but this advertising advantage may not outweigh the cost of receiving such approval. It is possible that in the face of strong competition and a price-cutting campaign, the school that had incurred considerable expense in reaching the approved standard would actually be at a competitive disadvantage.

Competition in Flying Instruction. If flying instruction could be obtained from the flying school only, the question suggested above would be more easily answered; but many other agencies have trained pilots in the past, are doing so now, and unless the present system of regulations is changed, will no doubt continue to do so. Among the most important of these are the flying clubs which have developed rapidly in the past two years and are increasing in popularity. Individual pilots also give instruction aside from their regular

1. Under the present regulations, the examination and rating of a flying school is made only upon request of the owners or representatives of the school.

duties. Dealers and distributors quite frequently include a limited amount of instruction with the sale of a plane. The most recent development in this field of instruction is the announcement of plans by two of the larger companies whereby instruction is purchased with a plane at a combination price.[1]

Permanency of the Flying School. In addition to these questions of competition within the field, the flying school is faced with the problem of its permanency. At present most aviation authorities believe that a more or less comprehensive system of flying instruction will always be necessary but much the same idea was entertained in the early development of the automobile. Many schools, for the purpose of teaching people to drive automobiles, were established and leading men of the industry predicted great future expansion for such a type of training. However, this type of school is practically extinct today and all necessary driving instruction is given by the salesman.

Airplanes are constantly being improved and made easier to pilot. Safety contests are sponsored and much attention is given to the designing and construction of a so-called "fool-proof" plane. In the light of past experiences, it is not beyond the realm of possibility to construct a plane that will to a large extent be independent of the pilot, one in which the average person can fly with a comparative

1. These planes were announced by Alexander Aircraft Company and Parks Air College. The saving afforded on a limited commercial license training is $815 and $1280 on the transport license when purchased with a plane at Parks Air College.

degree of safety with a minimum of training, and therefore, one in which the salesman can give the necessary piloting instructions as is done in the automobile industry today. The radio directional beam and the automatic pilot are two of these most recent developments in making the plane less dependent on control by the pilot.

B. Aeronautical Schools of Kansas City

There are now eight active flying schools, one ground school, three welding schools, and one aeronautical engineering school operating in Kansas City. An analysis of these companies and their operations is presented in the following pages.

Art Goebel School of Flying. The Art Goebel Aviation Company, a Missouri corporation, capitalized at $300,000, formally opened the Art Goebel School of Flying at Municipal Airport May 27, 1929. Colonel Arthur C. Goebel, famous aviator, is president of the company, and the board of directors is composed of well known Kansas City business men: Conrad H. Mann, Lou E. Holland, Herbert M. Woolf, R. L. Nafziger, J. C. Nichols, Joseph F. Porter, and Thornton Cooke.

Two buildings have been erected at Municipal Airport: (1) a main building with well equipped class rooms, administrative offices, and shop and assembly space; and (2) a hangar in which the student training planes are housed. Plans have been completed for the construction of a 250-student dormitory south of the present buildings. A general office is maintained at the Hotel Muehlebach in Kansas City, Missouri, in addition to the administrative offices at the airport.

Students train on a 90-acre tract of land, adjoining Mun-

icipal Airport, and at the Liberty, Missouri, municipal field, thus avoiding congestion at the Kansas City airport. The company owns the field adjoining the Municipal Airport, but leases the field at Liberty. The latter field is to be completely equipped with lighting and servicing facilities.

On November 8, 1929, the school had an approximate enrollment of 90 students.[1] Fifteen ships, including a Stinson-Detroiter 6-place cabin, were used for instructional purposes at that time.

The Army system of instruction is used exclusively in the school. This system was installed by army officers on leave of obsence from Brooks Field, an Army training field at San Antonio, Texas. These officers conducted a school for instructors who carried on the army system after the officers returned to their bases.

An employment agency is operated in conjunction with the school. A basketball team has been organized and games scheduled with other aviation school teams. Trips are made by air which gives the student more long distance flight experience. No insurance is provided the student in the list price of flying courses. If insurance is desired, it may be obtained from some agency outside the school and at the student's expense.

Up to January 1, 1930, only 26 schools had been approved by the Department of Commerce. The Goebel school received its approved certificate the first week of 1930.

1. Clyborne, H. V., sales representative.

Bennett Airways. One of the oldest aviation organizations in Kansas City, Bennett Airways, was established in 1924 by Dr. George L. Bennett, an early aviation enthusiast. The Pierce Field in Argentine, Kansas, was first used for training purposes and after one year at this field the training base was moved to Richards Field, now known as Commercial Airways. The Bennett school operated at the latter field three years, after which it moved to Municipal Airport. A ground school, located in Kansas City, Missouri, is operated in conjunction with the flight school.

Eleven airplanes are owned by the company and used for flying instruction. Nine instructors, three flight and six ground, constitute the instructional staff. On December 1, 1929, the school reported 75 students of which 54 were taking flight courses.[1] Plans have recently been announced for the erection of a $25,000 hangar at Municipal Airport and the doubling of equipment, including training planes and shop equipment.[2]

The Bennett school officials claim to have been among the first to introduce the finance plan for students taking flying instruction. It is also claimed that more transport pilots have been graduated from the Bennett school than from any other school in the country, but officials have been unable to substantiate the claim or at least have failed to do so. Employees and officials have failed to estimate the number of students trained, the number taking transport

1. Information supplied by Roy Harkins, sales representative, and Mrs. Gregory of the office.
2. Kansas Citian, December 17, 1929.

training, or the number graduated.

Consolidated Air College. The Commercial Airways Corporation was organized in April, 1928, by A. A. Yeomans and R. L. Gregory for the sole purpose of giving aeronautical instruction. A lease was secured from the Air Terminal Development Company for the old Richards Field and until December, 1929, the company operated a school at this airport. Beacon Airways was organized in the early part of 1928 and in June of the same year formed a subsidiary, the Consolidated Air College, for the purpose of operating a general aeronautical school. In December, 1929, this school and Commercial Airways were merged and are now operating as one unit under the name of Consolidated Air College at Richards Field under the lease held by Commercial Airways Corporation.

Twelve planes powered with six different kinds of motors are used for instructional purposes. From three to six pilots and three ground men are employed during the season of active operation, but only one flying instructor and one mechanic now compose the personnel of the school. Approximately 200 students have been trained in the two organizations to date.[1]

One of the advantages afforded by the Consolidated Air College is the operation from the private field away from the congestion of the larger airports and some distance from the more densely populated section of the city.

1. Yeomans, A. A., president of the school.

Curtiss-Wright Flying Service. The Curtiss-Wright Flying Service is the world's oldest flying organization, the Curtiss Exhibition Company having been founded by Glenn H. Curtiss in 1910. A new corporation was chartered in Delaware in 1928 known as the Curtiss Flying Service, Inc., to acquire the capital stock of the original company. This corporation is now one of the units of the Curtiss-Wright organization, formed August 15, 1929.

The company owns a fleet of airplanes, operates training schools and furnishes general flying service. It also has the exclusive agency for the products of Curtiss Aeroplane and Motor Company, Sikorsky Aviation Corporation, and Curtiss-Robertson Airplane Manufacturing Company.

Twenty-five flying schools are now operated by the Curtiss-Wright organization in the United States. Each school is a counterpart of the other, classes are uniform and instructinn is standard. Training is based on Army and Navy approved methods of instruction. A special school for the Curtiss-Wright instructors is maintained at Detroit, Michigan.[1]

Two buildings estimated to have cost $250,000 have been built by the company on Fairfax Airport from which all operations are based. Ten planes, including three Fledglings and two cabin ships were used for training purposes December 1, 1929. The instructional staff at that time consisted of six instructors, three flights and

1. Curtiss Fly Leaf, October, 1929.

three ground. Approximately 70 students were enrolled, of which number about half were taking flying instruction.[1]

A branch school was established at the Lawrence Municipal Airport in October, 1929. Two Curtiss airplanes and two instructors are stationed at this field for instructional and aerial-taxi purposes. Four students are now enrolled in the Lawrence branch.[2]

The Curtiss school was the first in Kansas City and one of the first twelve schools in the United States to be approved by the Department of Commerce.[3]

Porterfield Flying School (Universal). The Porterfield Flying School was established in 1925 by E. E. Porterfield, president of the American Eagle Aircraft Corporation. In 1929 a controlling interest was purchased in the school by the Universal Aviation Corporation, a subsidiary of the Aviation Corporation, ranked among the first three great aeronautical interests in the United States.[4]

The school is now one of a chain of ten schools located in as many different cities and in all sections of the country. Until July 1, 1929, the schools retained their separate names but from that date each school is known only by the city in which it is located, except the Kansas City school. These schools are operated from the national headquarters office in St. Louis, Missouri.

1. Dawson, Captain, manager of the Kansas City branch.
2. December 20, 1929.
3. Air Commerce Bulletin, No. 6.
4. Aviation Industry, p. 19.

A modern building has been constructed on Fairfax Airport from which all operations of the Universal Corporation in Kansas City are based. This building contains administrative offices of the school and the transportation lines, passenger terminal facilities, hangar space, and repair shops. Ten planes, consisting of four American Eagles, three Fleets, one Curtiss-Robin, one Ryan, and one Mono Coach, were used for instructional purposes in December, 1929. Seven instructors made up the personnel of the school at that time. One hundred seventy students were enrolled in the six courses offered by the school. Approximately 1,000 students have been trained in some phase of the aeronautical industry since the school was organized in 1925.[1]

The Department of Commerce placed the Porterfield school on the approved list of aeronautical schools October 3, 1929, only one week after the Curtiss school had been approved. These were the only schools in Kansas City to receive such approval during 1929.

Lathrop Trade School. The first aviation mechanics course to be offered by the Kansas City Public Schools was announced for the second semester of 1930. The course is taught by an instructor of the school and can accommodate about 20 students. High school graduates or those with mechanical experience are accepted for the class. An adult tuition charge of $70 is required of those over 20 years of age.

The Bureau of Aeronautics encourages such courses in the public schools and the War and Navy departments cooperate by supplying,

1. Biersmith, Tom, assistant sales manager of the Porterfield (Universal) School.

free of cost, equipment retired from their fields.

Sweeney Aviation School. The Sweeney Aviation School is the outgrowth of the Sweeney Automobile and Tractor School which has been in operation the past 15 years. Approximately 1300 students have been trained in the aviation school, most of whom have received training in mechanics and ground work rather than in flying.[1] The exact status of this school is in doubt, although still advertising that aeronautical courses are offered.[2]

American Eagle School Chain. The American Eagle Aircraft Corporation has recently announced plans to operate 276 airports in Missouri, Kansas, Nebraska, Iowa and Oklahoma in conjunction with the municipalities owning the ports. The airport will be leased on a 10-year basis and the American Eagle Company will equip each with a biplane and furnish a pilot. The pilots will act as head instructors of aviation schools to be established at each airport.

Flying instruction will be sold to students under a plan heretofore untried in the aviation industry. A book of tickets will be purchased, each ticket entitling the student to a certain amount of instruction at any time he has the time for it.

The chain was inaugurated in January, 1930, when the first school was established at Fairfax Airport, Kansas City, Kansas.

1. A letter from Mr. E. J. Sweeney, president of the school.
2. The school's flying equipment is reported to have been sold. A letter soliciting students was received December 7, 1929.

CHAPTER VII

SUPPLEMENTARY AERONAUTICAL ACTIVITIES

The preceding sections have been concerned with those companies whose operations are primarily in the major fields of aeronautical activity, the manufacture of aircraft, scheduled air transport, aeronautical instruction, and the operation of airports. Certain supplementary activities such as the manufacture of accessories and parts, sales and service facilities, insurance, and promotional and regulatory organizations are essential if the major phases are to operate efficiently and become a permanent part of the industrial life of the city. These supplementary activities are perhaps not so conspicuous as are those before discussed but nevertheless have a very important role in the aeronautical industry of Kansas City. This section will, therefore, be concerned with these miscellaneous companies and their services.

A. Miscellaneous Manufacturers

Aircraft Engines. No Kansas City company is at the present time producing aircraft engines on a commercial basis. The Franklin Aeronautical Corporation recently exhibited a new cam type engine which has been under development for the past eleven years by the inventor, George E. Franklin of Kansas City. The engine is now undergoing tests and will be put into production if the tests prove satisfactory.

Hangars. Canvas hangars, in four different sizes, are manufactured by the Baker-Lockwood Manufacturing Company; steel hangars

by the Butler Manufacturing Company, Columbian Steel Tank Company, Havens Structural Steel Company, and Kansas City Structural Steel Company.

Field Servicing Units. Aircraft refueling units equipped to service airplanes with gasoline, oil, water and air are built by the Butler Manufacturing Company and the Columbian Steel Tank Company. Transcontinental Air Transport ordered eleven of the Butler units when the transcontinental passenger service was begun. The Columbian Steel Tank Company recently built four units for the United States Army Reserve Corps.

Propellers. The American Sash and Door Company has added a propeller manufacturing department to its wood working operations. Wood propellers only are manufactured by the company.

Other Materials Used in Manufacture. The Bar-Rusto Corporation manufactures waterproof metal for airplanes; the Holeker Manufacturing Company, aluminum oil and gasoline tanks; and the Sewall Paint and Varnish Company, paints, varnishes, lacquers, and enamels; the Frank Paxton Lumber Company supplies wood and plywood for use in aircraft construction.

Accessories Manufacturers. Aeronautical clothing is manufactured by the H. D. Lee Mercantile Company and the Empire Cap Manufacturing company; goggles by the Specialty Optical Company.

B. Sales and Service

Airplane Distributors. Bennett Airways distributes "Eagle-rock", "Mono Coup" and "Mono Prep" airplanes in Kansas and Missouri;

Bredouw-Hilliard Aeromotive Corporation, "Flamingo" cabin planes; Curtiss-Wright Flying Service, "O. X. Robin", "Challenger Robin", "Sikorsky", and "Travel Air"; Marmon Motor Company, "Velie" Mono Coup; Tex LaGrone, "Waco"; and Herbert Woolf, "Stinson-Detroiter".

Accessories, Repairs and Parts. Bredouw-Hilliard holds exclusive sales and service rights for the "Wright" aircraft engine in the Western district. A branch house is now operated by the company at Wichita and another will be opened at Denver within two months. Exclusive service rights have also been granted the company for Municipal Airport.[1] Curtiss-Wright Flying Service distributes and services all products of the Curtiss-Wright organization and its affiliated companies. Universal Aviation Corporation has the exclusive sales and service rights for the Pratt-Whitney engines. These service rights are also held in Chicago, St. Louis and Wichita.

Each of these companies carries a complete inventory of repairs, parts and accessories for all standard airplanes. Service facilities are in charge of factory trained personnel.[2] The United States Army Reserve Corps maintains complete service facilities for government aircraft of all types. National Air Transport and other private operators, have their private repair and service units.

Storage. Storage, for planes of all types, is available in heated or unheated hangars on Municipal and Fairfax airports, and in

1. This includes only the public service, not the service of the operating companies maintaining facilities on the airport.
2. Smaller companies also offer similar services but on such a small scale that they have not been considered in this report.

an unheated hangar at Commercial Airways Field. Rates for storage are approximately the same as for similar services and accommodations in other aviation centers.

Automobile Transportation. Transportation to and from the airports is provided by the Kansas City Bus and Air Terminal and the Ni-Sun Bus and Air Lines companies. Each of the air transport companies provides transportation from the hotels and downtown offices to the airports from which their planes operate.

Fuel and Oils. Fuel and lubrication supply bases are operated at the principal airports by oil companies under contract with the leading transport companies.

Communication. Postal Telegraph maintains an office at the Air Terminal Building on Municipal Airport. Radio and teletype communication systems are used by the transport companies. Telephone service is available at all of the airports.

Engineering. The United States Aircraft Engineering School offers professional services in all aeronautical engineering problems including the design of aircraft and construction and operation of airports. George M. Thorne offers services in airport design, construction and management.

Insurance. National Aviation Underwriters has been formed by Jules B. Guinotte and H. E. Clark for the purpose of acting as underwriting manager or agent for insurance companies. Aviation insurance is also offered by W. A. Osgood, Oppenheimer Brothers, and

Shea and McCord.[1]

C. Flying Service Other Than Scheduled Air Transport

Saunders Fly-It-Yourself. One of the latest developments in the aeronautical world is the Fly-It-Yourself service inaugurated by the Saunders Company in Kansas City, September 15, 1929. The service is an outgrowth of the automobile rental system which the company has been operating for the past thirteen years and is similar to that system in principle and operation.

Arrow Sport open-cockpit biplanes have been adopted as standard equipment for the service. Six of these planes were delivered to the Kansas City office and are now available for public use. Any person or firm may rent one of these planes, but only those persons who hold government licenses may pilot them. The rental charge consists of three parts: a flight time charge, a possession time charge, and an insurance charge. Planes are equipped with meters which record the actual flying time, the number of revolutions of the motor, and the total time the plane is out of the company's hangar.[2]

Miscellaneous Flying Services. Aerial taxi, both local and long distance, is offered by Curtiss-Wright Flying Service, Saunders Fly-It-Yourself system, and various private operators. The Curtiss

1. This is perhaps not a complete list of all insurance companies offering aviation insurance; however, it does include all those companies advertising as such in the Kansas City newspapers and those listed in the Aeronautical Trade Directory of 1929, also by the Chamber of Commerce of Kansas City, Missouri.
2. Information from Aircraft Age, Aero Digest, and interview with the manager of the Kansas City branch, Major Landon.

service offers four tours of Kansas City and nearby cities in addition to special sightseeing trips. Tex LaGrone, Ruf Brothers, A. M. Hanna, Charles Quinn, Dr. John D. Brock, and James Smith are among those private operators offering the various taxi services.[1] Photography, mapping and surveying services are also available by special arrangement with the larger companies.

D. Aeronautical Organizations

United States Army Reserve Corps. In 1921, the United States War Department established six army bases for the purpose of training reserve officers, providing landing fields for the service planes, and promoting interest in commercial aviation. One of these bases was established at Richards Field in Kansas City.

The Kansas City unit now has approximately fifty members. These members, through the organization, have been active in fostering general aviation interest in Kansas City and territory. It was this group that made the extensive survey by which the present site of Municipal Airport was selected. Seven airplanes, consisting of six training and one service type, are maintained at the Kansas City Municipal Airport for training reserve officers. Complete servicing facilities are also provided for government aircraft.

National Aeronautical Association. A chapter of the National Aeronautical Association, an organization primarily for the advance-

1. Operators of this type are not often permanently located at any particular city. Those mentioned above have made Kansas City their headquarters for the past season or longer and have therefore been mentioned.

ment of aviation, is active in Kansas City. A temporary organization, called the Women's Division of the National Aeronautical Association, was formed in August, 1929.

Glider Club of Kansas City. In July, 1929, the Glider Club of Kansas City was organized as a chapter of the National Glider Association. Twenty-five members are now enrolled in the local chapter. This organization plans to train 100 glider pilots within the next six months.[1]

Aeronautics Division of the Chamber of Commerce. A special department devoted to the interests of aviation has been instituted in the chamber of commerce organizations of both Kansas City, Missouri, and Kansas City, Kansas.

Aeronautics Branch, Department of Commerce. The Air Act of 1926 created a new branch of the Department of Commerce known as the Aeronautics Branch. This branch was divided into several sections, one of which is the inspection and licensing of aircraft and pilots. The work of this section increased so rapidly that the United States was divided into nine districts with a supervisor in charge of each district. A supervisor was placed at Kansas City to have charge of the Kansas City district consisting of the four states: Missouri, Kansas, Nebraska and Colorado. The supervisor and six inspectors, three field and three factory, are now connected with the Kansas City office.

Private Flying Clubs. Several flying clubs have recently been formed for the purpose of securing flying instruction under the cooperative plan. Only two of these, however, are now active, the Ace

1. Thompson, Hugh L., president of the Kansas City chapter.

of Clubs Flying Club and the National Aeronautics Association Club.

E. Aeronautical Publications

Aircraft Age. An aeronautical magazine, devoted to the interests of aviation development in the Midwestern territory, was announced in the summer of 1929 and the first issue was made in August, regular monthly issues being continued until December. In January, 1930, the company was reorganized and has now resumed the publication of the magazine.

Chamber of Commerce. The Chamber of Commerce organizations of both Kansas Cities publish bulletins and advertising literature concerning the cities as aviation centers and the development to date.

Newspapers. The Kansas City Star and the Kansas City Journal-Post devote special sections to aviation in the Sunday editions.

CHAPTER VIII

SUMMARY

The remarkable development in the aviation industry during the past three years has been unparalleled in the history of transportation. Although this expansion has been both rapid and spectacular, certain characteristics of the industry are clearly defined.

A. General Characteristics of the Aviation Industry

Rapid expansion of any industry is likely to result in some maladjustment and such a result is evident in aviation. Aeronautical companies have been established irrespective of the economic factors which make for efficient operation or permanency of the respective enterprises. Operations have frequently been financed in a haphazard manner, and much of the activity has been characterized by shortsighted policies. Of this general condition, W. E. Boeing, a pioneer in the development of aeronautical transport, recently said, "There has been a tendency to finance new companies in response to the awakened public interest without taking into consideration their earning possibilities, ability to compete in design or production, and without considering present limitations of the market."[1]

Speculative Aspects. Even where the companies have been established under the most favorable circumstances, only small earnings have been realized. Many deficits have been incurred and divi-

1. Airway Age, January, 1930, p. 43.

dends have been reported only in very few cases. Of fifty one companies analyzed by Pynchon and Company in 1929, only ten reported any dividends since the beginning of operations. These dividends were not regular in payment and in five cases had been paid only once. It should also be noted that these companies are representative of the larger operating companies and not of the great number that actually make up the aviation industry. "No aeronautical investment yields a safe and satisfactory return"[1] continues the report. Yet an excess of five hundred million dollars has been invested in the aviation industry within the past two years.[2]

Rapid expansion of an industry in which earnings have seldom been realized and in which deficits have more often resulted, indicates that the aviation industry has been financed almost entirely by speculation. All industries have to an extent been similarly financed during the past few years, but speculation has been particularly rife in the aeronautical field. The desire for huge profits such as were received by the favored few in the automobile and railroad industries, combined with community or civic air enthusiasm have perhaps been responsible for the large amounts of capital made available to the aviation industry.

All phases of the aeronautical industry were acutely affected by the recent break of the stock market. New capital ceased to flow into the industry; expansion programs were halted and in some cases operations ceased. The newly organized companies were unable to begin

1. The Aviation Industry, prepared by Pynchon and Company in July, 1929, p. 8.
2. Report of Commercial National Bank and Trust Company of New York, July, 1929.

operations and those companies already operating were forced to make radical changes in their general business policies. Some authorities believe that this change marks the passing of the stage of "easy capital" in aviation enterprise. In this connection, Lieutenant-Commander Frank Mead, U. S. N. retired, says, "The public is about saturated with air securities, and the flush of air enthusiasm will no longer carry the financial burden of consistent loss."[1]

A considerable portion of the capital that has been invested in the aviation industry has come from the community in which the respective aviation enterprises are located, that is, the capital is local in character. Civic pride or civic enthusiasm has too often been the predominating factor in making an investment in aviation securities. An excellent illustration of the local character of aviation capital is the number of airplane manufacturing companies and their wide distribution over the United States. Another, but perhaps of less importance, is the number of aeronautical schools which have been organized in so many of the smaller municipalities of the Middle West.

Air enthusiasm and competition between cities for aviation facilities have no doubt accounted for much of the investment in the industry, but it should not be concluded that all financing has been of the promotional or sentimental type. Some of the operating companies are soundly financed and efficiently managed. The entrance of the bankers in the field and the many mergers resulting have added a cer-

1. Aviation, January 4, 1930.

tain element of soundness to the industry. At the close of the year 1929, four great aviation groups had resulted from the mergers of the past few months. The companies in these groups are adequately financed and are no doubt as sound as any concerns in a new industry. Except for these groups, sometimes referred to as the "Big Four", most of the companies now operating in all phases of the industry are local in character.

The Obsolescence Factor. Some of the problems of aviation have been considered from time to time in the course of this study. It has been noted that many of the phases of the industry are still in an experimental stage and that few definite policies have been adopted. The automatic pilot and the radio directional beam are now realities and will, without question, make some changes in flying activities. The experiments with the Diesel engine are reported as successful in both this country and Europe. Other improvements of less importance are being made and will add to the general activity. The industry is still so new that it is in a state of flux. No immediate radical change is expected by aeronautical engineers but improvements are constantly being made and present a real problem in obsolescence. W. B. Stout, president of the Stout Air Lines, recently said, "All present day planes will be obsolete in two years."[1] If the obsolescent factor is so great under ordinary development, certainly the expensive flying equipment of the companies today cannot represent any considerable amount of permanent capital.

1. Aero Digest, August, 1929.

Aviation not one of the Great Industries. Any industry that has been so generally built on a chiefly speculative basis, most often local in character, and that is in such a stage of development that equipment becomes obsolete in a few months time, cannot yet be considered a great industry. The amount of publicity that has been devoted to aviation has fostered the idea that the new industry is one of the great present day industries. Of this general opinion, C. Roy Keys, vice-president of the Curtiss-Wright Aeroplane and Motor Company, has said, "The aeronautical industry today is not truly a great industry from the point of view of size or invested capital."[1]

Public Attitude of Aviation Personnel. There has been, and still is, a feeling on the part of aviation men that they and the aviation industry are "separate and different". Consideration has been given above to the disregard of economic laws in financing and establishing individual enterprises. The impression is conveyed that flying is a superhuman accomplishment; that something is mysterious about an airplane and the ability to pilot it. That such practices have become all too general for the good of the industry is evidenced by the opinions of some of the authorities on aviation.

William B. Ziff, in an editorial in Aeronautics of December, 1929, says: "The aeronautical industry has traveled too long on its ego." Benjamin F. Castle, president of the Great Lake Aircraft Corporation, -- "The country is suffering from an hallucination which has

1. National Cost Accountants' Association Bulletin, August 1, 1929, p. 1413.

been brought about through the shortsighted doctrine of certain post-war aviation leaders who sought to convey the idea that it requires some sort of a superman to fly an airplane."[1] Another editorial summarizes this attitude in the following words: "If the industry will lose a fraction of its smugness and get rid of a few of the childish 'shows' encumbering its times, and sell the ordinary traveler and shipper on the values of aerial transport, it will have taken a long step forward towards solidifying its position."[2]

Much has been accomplished in building up the airmindedness of the public as is shown by the increased use of aviation facilities, but there is still a tendency for aviation personnel to take the public only partially into its confidence. The wide publicity given to aeronautical accidents is of course unfavorable but the attempt on the part of aviation companies to withhold and suppress the facts results in a feeling on the part of the potential air-using public that it has been told only part of the truth about aviation. An illustration of this attitude on the part of aviation companies is afforded by the removal of the wreckage of the recent Kansas City disaster before an investigation could be made.

B. Status of the Industry in Kansas City

The rapid expansion of aviation activities has been considered in preceding chapters. This expansion, as in many other centers,

1. Aeronautics, December, 1929, p. 19
2. Ibid. This position has also been taken by two of the Kansas City executives.

is largely local in character, that is, the capital and management are in the main drawn from Kansas City and the immediate territory.[1]

Municipal Airport, with the exception of the cost of the survey, has been wholly financed by Kansas City, Missouri. Commercial Airways field is owned by a closed corporation composed entirely of local business men. Fairfax Airport is under development by Woods Brothers, a Kansas City company concerned particularly with the development of the immediate territory. A small amount of stock in the airport was offered to the public but no information is available concerning the amount of this stock sold nor the general distribution of the issue. Thus, the Kansas City airports are predominantly local in character both as regards capital investment and management. The same condition, as regards airports, it is believed, will be found in any other city.

Of the Kansas City airplane manufacturing companies, only one had its inception outside of the city. This company, Rearwin Airplanes Corporation, was organized in Salina, Kansas, where the first ship was built. Associated with the company and reported to hold an equal interest with Mr. Rearwin, is A. R. Jones, a St. Louis oil man. When National Air Industries failed to meet the obligation on the factory building at Fairfax, the building reverted to Mr. Jones. The Rearwin factory was then moved into the building.

The American Eagle, Butler, Inland, and Kansas City Struct-

1. This does not mean that capital is wholly local, but it does mean that the larger portion of it is derived from men affiliated with Kansas City business and development.

ural Steel airplane manufacturing companies originated in Kansas City and are financed and controlled by Kansas City capital. Those companies, organized but not yet in production, and the Cook Glider manufacturing company, are entirely Kansas City enterprises.

The aeronautical schools, with the exception of Curtiss-Wright and Universal, are local institutions. The Bennett, Art Goebel, Consolidated Air College, Tuxhorn, and all welding schools were originated by Kansas City business men and are closely held and controlled by local boards of directors.

Limited Fixed Capital Investment. The aeronautical companies' capital investment in permanent improvements at Kansas City is relatively insignificant. The Art Goebel school owns a tract of land, adjoining Municipal Airport, on which a permanent building has been constructed. The Curtiss and Universal organizations have constructed permanent type buildings on long-term leased land at Fairfax Airport. The building of the Goebel school is used exclusively for school purposes but those of the latter companies are used for all the services provided by the respective organizations.

Landing fields for training purposes are leased by all of the schools. With the exception of the three schools mentioned above, all school facilities, including office space and class rooms, are leased. The school equipment, other than flying, is seldom of any particular value. Thus, flying equipment represents about the only capital investment of any importance, and the actual investment in

this is doubtful as will be shown in a succeeding section.

Of the accessories and service companies, Bredouw-Hilliard, Curtiss and Universal have permanent investments in the city. Bredouw-Hilliard, a local establishment, has constructed a modern building at Municipal Airport and carries an average inventory of $60,000 of aircraft parts and repairs. The Curtiss and Universal services are operated from the companies' bases in connection with their other activities.

The aerial-taxi services represent no permanent investment for the operators, and with the exception of the Curtiss-Wright Flying Service, are more or less transient. Saunders Fly-It-Yourself system was organized in Kansas City but owns no property, except six airplanes, in the city.

The transport companies for the most part are not Kansas City organizations, only one, United States Airways, having been organized in the city by local men. The permanent capital investment of these companies within the city is decidedly limited. Universal Aviation Corporation has one building at Fairfax Airport for the use of all its services, and National Air Transport recently purchased a hangar at Municipal Airport. Western Air Express, with its affiliated company, Mid-Continent Air Express, owns a hangar at Municipal Airport. Office space and other terminal facilities are most often leased. Flying equipment cannot usually be considered a permanent investment for it is transferred from one terminal to another as required.

The airplane manufacturing companies have perhaps made more investment in permanent construction in Kansas City than have any of

the other aeronautical activities. American Eagle and Butler have modern factories; Rearwin may be said to have its own factory building although not owned directly by the company.

A consideration of these conditions seems to justify two principal conclusions: (1) that the development in Kansas City, with the exception of scheduled air transport services, has been the result of local initiative and capital, and (2) that operating companies, with the exception of airplane manufacturers, have not invested any considerable amount of what might be termed permanent capital in the city.

Building for the Future. It should not be inferred from these conclusions, however, that these are totally unfavorable conditions and that Kansas City is the only center in which such conditions are found. In the fore part of this section the local characteristics of the entire industry were shown. It was no doubt necessary that such a condition result, and rather than constituting a disadvantage may ultimately prove to be decidedly advantageous, for these locally developed centers will be prepared for national development when such occurs. Unquestionably, much of the capital expenditure in aviation has been made in preparing for the future aviatinn possibilities rather than for present conditions.

The fact that the present operating companies have made comparatively small investments in permanent improvements at Kansas City does not warrant the conclusion that the industry within the city is

wholly on a temporary basis. Some of the present operating companies are no doubt temporary and will either discontinue operations or merge with other companies in the next few months, but other agencies have made permanent improvements which are of much importance to the industry.

The two airports, Municipal and Fairfax, are numbered among the best airports of the United States.[1] An extensive improvement program is planned, much of which is now in process; the United States Department of Commerce has developed lighted airways; weather bureau stations have been established in the city by the federal government and private transport companies. A federal radio station, which broadcasts weather data every half hour, has been located outside the city limits of Kansas City, Missouri. These represent permanent improvements that are essential to the industry. They may be termed basic factors of aeronautical activity. Investment in such is perhaps of more importance than investment by operating companies as required.

Lack of Cooperation among Aviation Companies. There is not that "esprit de corps" among the personnel of the various companies that could be expected in an industry which is so clearly dependent on the good will of the public. Complaints of the competitor's methods, his equipment and general policies, are current. Much suspicion of unfair competition and ulterior motives is entertained by some of the

1. Interviews with pilots including transport and air mail as well as local aviation men.

smaller enterprisers.[1]

There may be adequate reason for dissension among the various enterprisers. In any industrial undertaking there will no doubt be certain unscrupulous individuals who will countenance unfair business practices; but, whatever the cause, or causes, of such dissension, certainly an effort should be made to foster more of a spirit of cooperation among the aviation companies now operating in Kansas City.

C. Appraisal of the Study

Inadequacy of Information. Information obtained in interviews has been checked against published articles and information supplied by the Department of Commerce wherever possible. An attempt has been made to interview men representing two different departments of the various companies, for example, in a factory a member of the engineering staff and the sales director or general manager. The information given in this report is, therefore, believed to be as reliable as can be obtained under present conditions.

Even with the utmost care, however, certain information may not be absolutely accurate. For example, in the section on flying schools, an attempt has been made to determine the number of planes used for instructional purposes. The number given by the representative must be accepted for there is no way of checking the accuracy of the statement. The planes in the school's hangar may belong to stu-

1. In justice it should be said that these complaints have mostly been voiced by subordinate officers and employees, except in the small concerns where they came directly from the chief executives.

dents or personnel of the school or private individuals and may be available for instructional purposes only in case of emergency. The probabilities are that few of them are ever so used.

The flying equipment also varies from one period to another. Students sometimes purchase the training planes on the completion of their courses. In the case of the branch schools the equipment may be transferred from city to city as the need arises. Thus a comparison based on flying equipment may be misleading.

Similar conditions might be cited in the other phases of the industry as well. The factory personnel varies with the amount of experimental work in process as well as actual production. Flying equipment of the transport companies is moved from terminal to terminal as required. Where a company offers several services, as do Universal and Curtiss-Wright, the equipment is seldom stationary at any given center.

Averages have, therefore, been obtained and presented for whatever comparative advantage they might have. It is doubtful, however, if such averages in the present fluctuating state of the aviation industry can be of much value for research work.

Questions relative to the financial aspects of the various companies and their operating status have been answered unsatisfactorily, if at all, so that it has been impossible to secure any pertinent information concerning the financial set-up or operating statistics of the various companies. In some cases accurate information is not kept by the enterprises and in none is enough of such information available

to the public to be of any analytical value in a study of this kind.

Several factors are believed to account for this condition: (1) No adequate accounting records are yet in general use in the industry; (2) few companies have earned any return at all and the majority can be said to have operated at a loss so that accurate financial information would serve to curtail new capital coming into the industry (it has already been mentioned that the industry has been almost wholly dependent on speculative capital); (3) the aviation companies receive so many inquiries concerning services and operating statistics that it is impossible to supply such information without considerable office expense;[1] (4) some of the companies are so recently organized that facilities for providing such information have not been developed; and (5) a few of the executives see little or no purpose in a study concerned with the analyzing of the present industry.

It is to be regretted that adequate operating statistics are not to be obtained for no thorough report can be made of hastily made estimates and surface indications.

Depression in the Industry. This survey was made at the time of the most serious depression yet experienced in the aviation industry and it is possible that the position of the various aeronautical companies has been revealed to the investigator in the most unfavorable circumstances. However, the present position is of utmost importance

1. Forty per cent of the correspondence received by the American Eagle Company is estimated to be of the school boy curiosity type. This company, however, attempts to answer all inquiries for it considers that such a policy builds up good will.

for the ability of the individual concerns to weather the depression period and be prepared for an increased business when the recovery comes will to a large extent determine the permanency of the industry in a given center.

A prediction as to the future of aeronautical activities either in Kansas City or in the nation is impossible. The basis of an industry has been established; adequate leadership will now determine the extent to which the industry will develop both locally and nationally.

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