The
AIRCRAFT
YEAR BOOK
For 1931
The AIRCRAFT YEAR BOOK

For 1931

Volume Thirteen

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CHAPTER I

WHAT'S AHEAD FOR 1931?

Readjustments of 1930 Under Trial—Great Year in Air Transport Foreseen
—Major Airship Projects Under Way—Military Aviation Important
Factor—Expect Some Improvement in Commercial Market

WITH the opening of 1931, man entered his twenty-eighth year of
flight and the aviation industry left behind it an unusual record
of achievement and readjustment. In common with the experi­
cences of much older and, therefore, more firmly founded industries, 1930
was a critical year in aviation.

This, the thirteenth successive edition of THE AIRCRAFT YEAR BOOK,
is a record of aeronautic development throughout the world during
1930. It is designed to reflect the trends in the industry during a period
of world-wide depression, to review the progress made, to appraise the
known effects of certain readjustments, and thus to provide a possible index
to the immediate future.

Judged from the viewpoint of air transport development, impressive
flights and operation records, 1930 was without doubt a period of marked
achievement overshadowing any previous year. Examined through the
eyes of those who undertook elaborate promotional projects and those
speculators who predicated their activities upon the continuance of business
conditions on the 1928–29 level, 1930 was certainly disappointing. Viewed
from the position of the industry as a whole, 1930 was a critical period
designed to have a corrective and constructive influence upon the develop­
ments of 1931, because the industry had settled upon a firmer and deeper
foundation.

Despite generally depressed conditions in all industries, air transport
experienced the greatest year in its history, doubling and tripling the peak
traffic figures of 1929 for the volume of miles flown, passengers carried,
and mail and express transported. The year witnessed a remaking of the
air transport map of the United States as a result of the efforts of the Post
Office Department and the passage by Congress of the McNary-Watres Air
Mail Act. New alignments of the interests controlling the major lines
resulted; mail contractors added passenger services on their routes; old lines
were abandoned or extended, and new ones added.

The full effect of these factors could hardly be visible before the summer
of 1931 when operators were to swing into their new schedules, equipped
to handle more traffic. The air transport operators, aware of their respon-
sibilities under the air mail legislation, were making substantial investments in new equipment and improved ground facilities to assure the public of a superior and vastly swifter service at rates but slightly above those of first class rail travel. In the air transport field, 1931 promised to be the greatest year in aviation history if the untested factors growing out of the readjustments of 1930 proved sound. The contractors, however, needed the continued assurance of support from the government under the new act to sustain and encourage them in the individual efforts they were making toward unsupported commercial operation at a time when capital was reluctant to reenter even the older industries and more stable forms of investment.

Exceeding in international significance even the new alignments of interest effected within the United States, Latin American air transport experienced the opening of a new phase which in its importance was little less than a new era in transportation. The American air transport effort South of the States stood united as a result of consolidating in 1930 the two major American companies operating there. That consolidation, in turn, nourished a growing spirit of international cooperation between foreign air transport interests. French, Dutch, German and British interests were definitely coordinated with American so that the efforts of all could be devoted to constructive ends rather than diverted to destructive competition. It remained for 1931 and succeeding years to reveal the world-wide importance of these agreements.

Eventual air transport across the seas moved a step closer to realization as 1931 opened with plans for world airship services definitely taking form. The world’s largest dirigible, the ZRS-4, was being completed in Akron for the United States Navy. It was scheduled to be launched in 1931. Upon the experience obtained in building this and a second dirigible for the Navy, American airship interests planned other ships for commercial trans-oceanic service. The plans of two companies formed to establish world-wide commercial transportation with rigid airships were authoritatively announced during 1930. The new year was destined to see further progress on these projects which linked foreign airship interests with those of America. In this stupendous undertaking to create an American airship merchant marine, the Navy’s airship construction program was acknowledged to be an essential factor.

In making an analysis of the past or in projecting a picture of the future, the unique position of aircraft in transportation must always have an important bearing. Speed—one of the most important factors in successful modern transportation of any kind—is the lifeblood of air transportation. It is a point of excellence which no other existing form of transportation threatens to overshadow. Airplanes of the past year were, at least, three times as fast as the next speediest mode of transportation.
The public has always paid a premium for added speed in transportation, and it appeared safe to believe that speed would continue to command a predominant position.

Military aviation, always an important factor in American aeronautics, stood out as particularly significant during 1930 when certain phases of commercial aviation failed to approximate popular imagination. The Army Air Corps flew 32,500,000 miles during the year, while the Navy and Marine Corps logs totaled nearly 26,500,000 miles. Both constituted new operating records. It appeared that the Army Air Corps, with continued appropriations called for under the Five Year Program, would have the 1,800 serviceable airplanes called for at the end of the designated period. The Navy also was nearing completion of its Five Year Program with the 1930–31 authorizations designed to raise the number of airplanes to 1,000 by 1932 in accordance with provisions of the plan approved by Congress in 1926.

The importance of military procurement as the tangible nucleus of engineering and production in the American aircraft industry was more apparent than ever at the beginning of 1931. The industry by that time had been largely deflated. Ambitions and hopes which had attracted inexperienced personnel and volatile capital into aviation had lapsed, and with their passing, a more accurate perspective was possible. Just as it was impossible in 1928 and 1929 to expand the industry a thousand diameters (although such was the actual appearance), so it likewise was impossible in 1930 to destroy the industry that existed. What aviation “lost” it never actually possessed.

It was certain that those elements in the industry which were able to continue successfully through 1931 would require and deserve the maintenance of a military procurement program. This program in the field of construction, like the air mail act in the operating field, would supply aviation with a minimum of assured activity to reasonably and conservatively develop its resources. It deserved such a program because it was ploughing its receipts back into the business. The life of the aircraft industry always will be engineering; its nutriment, production. In commercial aviation, the latter could not come until the former had received attention. It was certainly apparent that before the public buys airplanes in quantity, it would demand improvement and scientific advance possible only in the laboratory and at great expense. In military aviation, engineering underlies procurement, because the strength of national defense can be evaluated in terms of the progress made in development of new equipment to replace that which becomes obsolete.

In its determined effort to place air transport and private and industrial flying upon a truly commercial basis by improving equipment and operations, and in its endeavor to supply the national defense with the most
advanced types of military aircraft, it was not unnatural that the industry early in 1931 was disturbed at the approaching completion of the Five Year Military Programs and the consequent possible resumption of conditions which prevailed prior to 1926. At that time, disastrous competition held free play and the fruits of engineering were lost when proprietary rights of design were ignored. However, the industry entered 1931 with the reassurance of a more general understanding of the facts, and confident that, as it demonstrated its determination to promote commercial aviation, public opinion and national policy would evolve an answer to the military construction problem at the right time.

As will be seen in succeeding chapters, aircraft production in 1930 was less than half that of the peak year 1929. The military and air transport markets constituted the chief outlets for aircraft produced. These two fields were certain to prove of major importance again in 1931. With proper regard for economy, many manufacturers concentrated their efforts upon improving old products or preparing to introduce new ones, because they realized that the real bid for supremacy in the commercial market during 1931 and 1932 was almost certain to be based upon the achievements of the engineering laboratory. In the light airplane field, 1931 was to see the appearance of several small planes to sell from $1,000 to $1,500. Their success depended upon general public acceptance. Manufacturers also devoted considerable attention to the development of suitable planes with larger payloads for industrial use as well as more attractive ships in the private-owner field. No nation in the world had as much industrial and private flying as the United States, and this market promised to be an important one for manufacturers who could meet the specialized needs of the industrial or private owner.

The fact that commercial aircraft sales exceeded production throughout 1930 indicated that the major part of the stocks built up as a result of overproduction in 1929 were exhausted by the opening of 1931. It indicated that production in 1931 would most likely be increased over 1930 to meet the demands for necessary replacements in every field, as well as the market for new planes resulting from normal growth. The fact that the United States managed to hold its volume of aeronautic exports within five per cent of the peak reached in 1929 also was significant. It indicated that any improvement in world-wide business conditions was almost certain to see a complementary improvement in the export market during 1931. The events of 1929 and 1930 taught all elements in the industry to be conservative in their estimates of growth, but it could be said with a fair degree of safety that there would be an improvement in the commercial aircraft market during 1931, although production was not expected to approach the peak of 1929.

The manufacturing field lost two great pioneers during 1930 in the
SOUTH POLE THEIR GOAL
Ford monoplane "Floyd Bennett" (3 Wright engines) climbs higher and higher as it passes over Liv Glacier on the flight to the Pole, carrying Rear Admiral Richard E. Byrd and his companions.

BROADWAY HONORS AN AIR HERO
Rear Admiral Richard E. Byrd acknowledging the cheers of New Yorkers who crowd Broadway upon his return from the South Pole conquest.
death of Glenn H. Curtiss and Chance M. Vought. Only a month before his death, Curtiss retraced the course of his historic flight from Albany to New York in a celebration sponsored by the Aeronautical Chamber of Commerce to commemorate the twentieth anniversary of the history-making exploit. Vought was the head of the manufacturing division of United Aircraft and Transport Corporation bearing his name. Both had been active in the work of the Aeronautical Chamber of Commerce since its founding. Aviation also lost a generous friend in the death of Daniel Guggenheim, who appropriated large sums of money from his personal fortune to carry on the work of the Guggenheim Fund for the Promotion of Aeronautics.

History-making exploits of 1930 rivaled those which fired the world with enthusiasm for aviation in 1927. Coste, Bellonte, Kingsford-Smith, Von Gronau, Eckener, Hawks, Lindbergh, Mermoz, Johnson, Boyd, Williams, Yancey and Soucek were among the names figuring prominently in the year’s most spectacular flights. Their achievements will be reviewed at length in a later chapter. It possibly was true that repeated success on trans-oceanic and long distance flights had made these exploits less romantic and more commonplace in the eyes of the general public, but they continued to be an interesting measure of advancement for the aviation industry.

The progress in world air transport development, spectacular flights...
to all part of the globe, and methodical advances in the improvement and employment of aircraft equipment all served to point to aviation as a factor certain to have a profound effect upon international relationships. It was becoming increasingly apparent that aviation was to have as great an effect upon the lives of nations as the automobile has had upon family life and community relationships.

Fifteen years ago, aviation was little more than a fantasy, with a very few experimenters devoting their attention to it. Ten years ago, it seemed a vain hope, with the engineering thought summoned to it during the World War reverted to older industries. In 1931, the genius of men devoted to the basic sciences from which other great industries have sprung was available to aviation.

Through radio telephony, the human voice is projected from America to Australia. Through aircraft, physical cargoes, living and inert, were destined to be transported at high speeds and in comparative safety to the ends of the earth. Each year has seen the aviation industry through its many branches move a step closer to the realization of this vision of commercial aeronautics’ place in the scheme of world relationships. The new year, 1931, is almost certain to see important developments toward this end.
TRANSPORTS OF TWO CENTURIES
An old Wells-Fargo stage coach draws up beside the first tri-motored Ford (3 Pratt and Whitney Wasps) placed in new service by National Air Transport.

SHIPS OF AIR AND SEA
"Puritan," non-rigid airship, speeds past the giant S. S. Leviathan as it steams out of New York harbor headed for ports across the sea.
CHAPTER II.

INDICES TO PROGRESS IN 1930

American Planes Fly 225,000,000 Miles in 1930—Air Transport Lines
Double Passenger Traffic—All Government Flying Increased—Aircraft and Engine Production Half of 1929—Other Statistics

STATISTICS, accurately compiled and properly interpreted, furnish
an important index to the progress of an industry and its most likely
future trends. They are particularly important to a young industry,
such as aviation, because they serve as an active barometer to readjust-
ments effected during formative years of development. The Aeronautical
Chamber of Commerce, as the national trade association of the aircraft
industry to which all branches of the business turned for information, was
in a unique position to keep its finger on the pulse of the industry from
day to day throughout the year. Recognizing the importance of current
statistics to every phase of the industry, the Chamber redoubled its efforts
in this field during 1930 and expanded its facilities for the collection, comp-
ilation and distribution of statistical information. The result makes
possible far more detailed statistical tables and analytical graphs in The
AIRCRAFT YEAR BOOK for 1931 than in previous editions of this book.

Aircraft under the American flag, including planes in civilian, com-
cercial and government operation, flew more than 225,000,000 miles during
1930, an increase of more than 27,000,000 miles over the previous peak
year, 1929.* This was considered particularly significant during a year in
which many older industries showed a falling off of activity in their
operation statistics. Civil and commercial planes flew 164,793,612 miles
during 1930 as compared with 149,579,451 miles in 1929. Government
planes, including those of the Army, Navy, Marine Corps, Coast Guard
and Department of Commerce, flew 60,473,355 miles during 1930 as com-
pared with 47,967,139 miles in 1929.

Air Transport

Thirty-four major air transport operators reporting to the Aeronautical
Chamber of Commerce during 1930 carried 385,910 passengers, 286,798
pounds of express† and 8,005,201 pounds of mail. They flew 28,833,-
967 miles out of 30,703,119 miles scheduled during 1930. As will

* Detailed analytical table “Flying in the United States” in Appendix.
† Not including approximately 2,000,000 pounds of freight carried by Ford Air Lines.
be seen quickly from accompanying graphs, this represented an increase of more than 133 per cent. over 1929 in passengers carried, and an increase of about 42 per cent. in miles flown. The graphs, as well as the statistical tables in the Appendix,* provide a vivid picture of the growth of scheduled air transport operations during the last five years. They show monthly averages for years in which operations statistics were compiled only once each year and provide a month-by-month report for 1930.

The completeness of this report on air transport operations during 1930 can be seen from the following list of scheduled operators contributing

![Miles Scheduled and Flown by Air Transport Lines in United States](image)

Miles Scheduled and Flown by Air Transport Lines in United States


* See Air Transport Summary under “Flying in the United States” and “Air Mail Operations” in Appendix.

Aerial Service Operations

The detailed statistical study made by the Aeronautical Chamber of Commerce in the aerial service field for 1930 showed a reduction in the number of operating companies. Statistical estimates based on typical reports and computed to include 600 aerial service operators in the United States showed that 5,324 planes in service flew 95,959,645 miles during 1930 on missions that ran the gamut of diversification, from short hops to crop dusting and aerial photography. These operators carried 2,621,769 passengers during 1930 on charter flights or short hops. These figures were slightly under those for 1929 when 104,336,560 miles were flown and 2,995,530 passengers were carried, but compared very favorably with any year prior to 1929.* Since the aerial service field includes all commercial

* See Aerial Service Summary under "Flying in the United States" in Appendix.

Air Transport Passengers Carried on Regular Schedule in United States
flying not considered scheduled air transport and is a promising one for future development, these statistical analyses are discussed further in a later chapter, "Airplanes Jacks of All Trades."

Private and Industrial Flying

As was observed in the opening chapter, no nation in the world has a volume of private flying, both corporate and personal, approximating the proportions of that which exists in the United States. Because of the very character of this activity, it was practically impossible to obtain exact statistics on the miles flown by private individuals or corporations. How-

![Graph of Production and Sales of Commercial Airplanes in United States]

ever, there was a marked increase in the extent to which such planes were employed during 1930 and the Aeronautical Chamber of Commerce estimated that 40,000,000 miles were flown during the year by the private or industrial flier, an increase of about 15,000,000 miles over 1929.

Government Operations

The United States Army Air Corps flew 32,500,000 miles during 1930, a marked increase over 1929 when 27,405,790 miles were flown. The United States Navy showed even a greater proportional increase during
1930, flying 26,478,700 miles as compared with 19,513,095 in 1929. The United States Coast Guard increased its total miles flown from 48,254 in 1929 to 67,655 in 1930. While no exact statistics on the mileage flown by the Department of Commerce was available, it was estimated that the Aeronautics Branch increased its activities from 1,000,000 miles flown in 1929 to 1,427,000 miles during 1930.*

Aircraft Production and Sales

While aircraft production during 1930 was less than half that of 1929, sales more than kept pace with manufacturing schedules to enable the movement of stocks on hand as a result of the period of over-production in 1929. It appeared that these assembled inventories had been substantially depleted by the opening of 1931.

American aircraft manufacturers produced 2,684 commercial and military airplanes during 1930 as compared with 6,034 units manufactured in 1929. Planes sold during 1930 totaled 3,125. No sales statistics were com-

* Detailed comparison of Government Operations by years under “Flying in the United States” in the Appendix.
Compiled in 1929 to afford a comparison. In the commercial field, 1,937 airplanes were built and 2,324 were sold during 1930. In the military field, 747 planes were manufactured and 801 were sold. The number of military planes produced represented an increase of 70 over the 677 manufactured in 1929. The commercial field showed a decided curtailment of production if the 1,937 planes manufactured in 1930 were compared with 5,357 made in 1929. The graphs provide an interesting picture of the month-to-month production and sales statistics for 1930 compared to the monthly averages for previous years.

The total value of aircraft produced by American manufacturers during 1930 was $21,469,763 as compared with $44,457,300 in 1929. Sales in 1930 totaled $22,938,552. Commercial airplanes produced during 1930 were valued at $10,746,043, while military aircraft manufactured was valued at $10,723,720. Commercial sales during the year were reported at $11,666,209, while military sales totaled $11,272,343. Detailed analysis of these statistics on production and sales for 1930, with comparisons for 1929 and 1928, are provided in the Appendix.*

It is interesting to note that an analysis of airplanes produced and sold

*See “Production and Sales of Salable Aircraft in the United States” in Appendix.
during 1930 indicates a continued predominance of the open cockpit biplane, and particularly the three place open cockpit biplane. Only second to the three place job was the two place open cockpit biplane. Biplanes, generally, continue to outnumber monoplanes with 1,110 commercial biplanes produced as compared with 793 monoplanes. In the multi-engined field, however, monoplanes had a decided edge on biplanes in the number of units manufactured. The seaplane and amphibian market still remained to be developed on a scale commensurate with its potential importance. Only 17 seaplanes and 17 amphibians were produced and 23 seaplanes and

36 amphibians sold during 1930. However, their total value was approximately one-third that of the 1,110 land biplanes manufactured. The detailed analysis of this production and sales information in the Appendix is worthy of further study. It has been designed to permit comparisons at a glance.

The thoroughness of this statistical information on aircraft produced and sold by American manufacturers during 1930 can be seen from the following list of 75 manufacturers reporting their figures to the Aeronautical Chamber of Commerce during the year: Aeromarine Klemm Corporation; Aeronautical Corporation of America; Alexander Aircraft Company; American Aeronautical Corporation; American Eagle Aircraft Corporation;
Amphibians, Inc.; Arrow Aircraft and Motors Corporation; Atlanta Aircraft Corporation; Bach Aircraft Company, Inc.; Bellanca Aircraft Corporation B/J Aircraft Corporation; Bird Aircraft Corporation; Boeing Airplane Company; Buhl Aircraft Company; Butler Aircraft Corporation; Cairns Aircraft; Cessna Aircraft Company; Chance Vought Corporation; Command-Aire, Inc.; Consolidated Aircraft Corporation; Crawford All-Metal Airplane Company; Curtiss Aeroplane and Motor Company, Inc.; Curtiss-Wright Airplane Company; Davis Aircraft Corporation; Detroit Aircraft Corporation; Douglas Aircraft Company, Inc.; Driggs Aircraft Corporation; G. Elias and Brother, Inc.; Eyerly Aircraft Corporation; Fairchild Airplane Manufacturing Corporation; Fokker Aircraft Corporation of America; General Airplanes Corporation; Great Lakes Aircraft Corporation; Granville Brothers Aircraft, Inc.; Hall-Aluminum Aircraft Corporation; Hamilton Metalplane Company; Heath Aircraft Corporation; Huntington Aircraft Corporation; Inland Aviation Company; Jayhawk Aircraft Corporation; Kari-Keen Aircraft, Inc.; Kellett Aircraft Corporation; Keystone Aircraft Corporation; Lincoln Aircraft Company, Inc.; Glenn L. Martin Company; Mercury Aircraft, Inc.; Metal Aircraft Corporation; Mohawk Aircraft Corporation; Mono Aircraft Corporation; Mooney Aircraft Corporation; New Standard Aircraft Corporation; Nicholas-Beazley Airplane Company, Inc.; Northeast Airways, Inc.; Paramount Aircraft Corporation; Pheasant Aircraft Company; Pitcairn Aircraft, Inc.; Pittsburgh Metal Airplane Company; Rearwin Airplanes, Inc.; Sikorsky Aviation Corporation; Simplex Aircraft Corporation; Solar Aircraft Company; Spartan Aircraft Company; Stearman Aircraft Company; Stinson Aircraft Corporation; Swallow Airplane Company; Szekely Aircraft and Engine Company; Taylor Brothers Aircraft Corporation; Texas Aero Corporation; Timm Aircraft Corporation; Towle Aircraft Company, Inc.; U. S. Aircraft Company of New Jersey; Verville Aircraft Company; Waco Aircraft Company; Watkins Aircraft Company.

**Engine Production and Sales**

The number of aircraft engines produced during 1930 was approximately half that of 1929. Aircraft engine sales during 1930 more than kept pace with production to deplete stocks on hand in most factories by the close of the year. Commercial and military engines manufactured during 1930 totaled 3,766 valued at $17,078,916 as compared with 7,373 valued at $26,495,830.15 in 1929. Aircraft engine sales for 1930 in both the commercial and military fields totaled 3,846 units valued at $17,288,219. The graphs indicate the month-to-month production and sales trends in the engine field during 1930 as compared to the monthly average for the previous period.
Commercial and military production was fairly evenly divided during 1930 with 1,925 units produced and 1,961 sold to the commercial market while 1,841 engines were manufactured and 1,885 were sold to the military services. The analysis of production and sales statistics by horsepower* indicates that the largest number was produced and sold in the 76 to 125 horsepower class. However, engines produced and sold for the commercial market over 300 horsepower had more than twice the total value of those manufactured in the 76-125 horsepower class.

The completeness of this statistical report on aircraft engine production and sales, like that in the aircraft field, can be seen from the following list of 27 engine manufacturers reporting their figures to the Aeronautical Chamber of Commerce during the year: Alliance Aircraft Corporation; Allison Engineering Corporation; American Cirrus Engines, Inc.; Axelson Aircraft Engine Company; Century Rotary Motor Corporation; Chevolair Motors, Inc.; Chevrolet Aircraft Corporation; Comet Engine Corporation; Continental Aircraft Engine Company; Curtiss Aeroplane and Motor Company, Inc.; Dayton Airplane Engine Company; Fairchild Engine Corporation; General Air Motors Company; Heath Aircraft Corporation; Kimball Aircraft Corporation; Kinner Airplane and Motor Corporation; Lambert Aircraft Engine Company; LeBlond Aircraft Engine Corporation; Lycoming Manufacturing Company; MacClatchie Manufacturing Company; Menasco Motors, Inc.; Michigan Aero-Engine Corporation; Pratt & Whitney Aircraft Company; Prest Airplanes and Motors; Szekely Aircraft and Engine Company; Warner Aircraft Corporation; Wright Aeronautical Corporation.

American Aeronautic Exports

America’s growing aeronautic export market promised to offer a new outlet for the products of American manufacturers in future years. American equipment was being flown in scores of foreign countries with satisfactory results reported. It was significant that American exports of aeronautical equipment, including aircraft, engines and parts, during 1930 were within five per cent. of the total for 1929, the peak year. During the first 11 months of 1930 for which reports were complete, American manufacturers exported 298 planes valued at $4,557,791, 370 engines valued at $1,623,737, and aircraft parts valued at $2,172,501.

Canada continued to be the principal export market for American equipment, while China, Soviet Russia, Peru, Mexico, Brazil, Japan, Chile, and Argentina were important outlets. The detailed table on aircraft, engines, and parts shipped to foreign countries during 1930, compared with exports in previous years, offers an interesting study.†

* See “Exports of Aircraft, Engines and Parts from United States” in Appendix.
† See “Exports of Aircraft, Engines and Parts from United States” in Appendix.
Statistics on aircraft accidents compiled by the Department of Commerce indicate a decided improvement in the safety of air transport operations during 1930 as compared with previous years, while all other flying grouped in a single classification showed a slightly better record.

While the Department of Commerce had not completed the compilation of its accident statistics for the second six months, it was authority for the statement that there were but three fatal accidents in scheduled air transport operations during the last half of the year, only one of which involved a passenger. The statistics show that the scheduled air transport operators flew 2,817,121 miles per fatal accident during the first six months of 1930 as compared with 1,022,371 miles per fatal accident during the corresponding period in 1929. The record for the second six months, with better flying weather and only half the accidents recorded during the first half, was certain to be much better than any previous period in the history of air transport operations.

The percentage of accidents in air transport operations as compared with all other flying continued to be reduced during 1930, with only 4.73 per cent. of the accidents in scheduled operations. Pilots' errors and weather conditions continued to be the principal causes of accidents as can be seen from the analysis made by the Department of Commerce.* Structural failures had come to be an almost unheard of cause of accident.

Aircraft, Pilots and Mechanics Licenses

Licenses issued by the Department of Commerce for aircraft, pilots and mechanics continued to be an important source of statistical information used by manufacturer and distributor-dealer alike. The Aeronautical Chamber of Commerce kept analyses of the license lists up-to-date to illustrate the number and geographical distribution of airplanes, pilots and mechanics. Several interesting analyses of this type are included in the Appendix. Further consideration to the relative number of licenses issued as compared with former years will be given in a later chapter, "Preening Wings of Commerce."

With this rather weighty statistical background, the following chapters are designed to provide the reader with a picture of the year's developments in every phase of aeronautics. Statistics will be used sparingly and only when they seem pertinent to the discussion.

* Comparative tables on accident statistics in Appendix.
CHAPTER III

OVER THE NATION'S AIR LINES

Traffic Doubled during 1930—Effect of McNary-Watres Act—Changes in Air Transport Map—Effect of Fare Reductions—Mergers, Purchases, Consolidations—Major Group Control

Air transport experienced the greatest year in its history during 1930 and the United States led the world in the volume of passengers, mail and express carried on its regular air lines. The phenomenal expansion of air transport activity during the year served as an inspiration to other branches of the industry which failed to withstand the general economic depression, and, with military construction, was an important force in sustaining the resources of manufacturing interests.

The year witnessed a drastic remodelling of the nation's air transport map, with a new alignment of operating companies and a vast revision of schedules. The McNary-Watres Act, passed by Congress to stimulate the development of air transport and particularly the carrying of passengers by air, was a powerful force in revamping the transport situation. Conferences of officials of the leading transport companies with Postmaster General Walter F. Brown on problems growing out of the administration of the act extended throughout most of the year. The new air mail bill also had a definite effect upon the trend in design in aircraft manufacturing, as will be seen in later chapters concerned with technical and engineering phases of the industry.

To the air traveller, the year's expansion meant the opening of passenger services on all routes between principal cities throughout the country and the speeding up of schedules to provide a fast and comfortable service. New, improved equipment was added to care for the increased traffic and air lines concentrated their attention upon the construction of better air terminals and ground facilities to insure safety and regularity of operations and add to the passengers' comfort. Two-way radio communication between planes in flight and their ground bases was installed on the major air lines, and an extensive weather reporting service was employed to keep pilots well-informed on conditions along their courses at all times. This progress in the improvement of physical equipment will be discussed more fully in a later chapter, "Air Terminals on Land and Sea."

Although 1929 was a peak year for the transportation of mail, passengers and express by air, 1930 figures doubled and nearly tripled those
of the previous year. Passengers, mail and express were being flown more than 102,000 miles every 24 hours, with more than one-third the distance being flown between dusk and dawn on the lighted airways which served as the "boulevards of the sky." One hundred million people, a major share of the nation's population, were placed within useful distance of the air transport network. This service did not take into consideration another 20,000,000 people on the American-owned lines in Canada and Latin America which flew an additional 14,421 miles daily. The South American

HEADED FOR SAN FRANCISCO

Fokker F-32 (4 Pratt and Whitney Hornets) ready to leave the Alhambra terminal of Transcontinental and Western Air, Inc., for 'Frisco.

development was so phenomenal and so crowded with international significance that it has been considered worthwhile to consider these events in a separate chapter, "Latin America By Air."

Fare vs. Fear

Reductions in fare early in 1930 had an important bearing upon the rapid increase in the volume of passenger business on the scheduled transport lines. Many of the lines, expecting a lull in their winter business, cut rates to rail-plus-Pullman levels in an experiment to determine whether high fares were a greater hindrance to the rapid development of passenger
HEADED FOR NEW YORK
National Air Transport inaugurated six and one-half hour service from Chicago to New York with Ford monoplanes (3 Pratt and Whitney Wasps).

BOARDING NEW YORK PLANE
Passengers boarding new Ford tri-motor plane (3 Pratt and Whitney Wasps) of National Air Transport at Chicago Municipal Airport.
traffic than public fear, which received such a major share of attention by those who theorized upon the obstacles to general use of air lines by the travelling public. The answer was an overwhelming one, pointing directly to fare as a greater consideration than fear. Traffic increases of from 100 to 500 per cent were reported by the principal operating companies, and many were unable to handle the volume of business with their regular equipment.

The experiment also demonstrated just as positively that the operators could not continue to maintain these rates with present-day equipment and operating schedules with hopes of making expenses, to say nothing of a fair profit. It showed that the lines needed some other source of revenue, such as a mail contract, to permit general stimulation of passenger business at even a moderately low rate. Late in June or early in July, practically all of the lines which had been operating at the low rate increased their tariffs slightly so that a fare of seven cents per mile was generally adopted. When it was considered that the distance between principal cities was often much closer by air than by rail, the seven cent level was not far above that of rail-plus-Pullman. It was certainly far below the average passenger rate in force during 1929, shown to be 10.6 cents per mile in the survey made by the Aeronautical Chamber of Commerce. The trend in rates was shown graphically in the charges made for passenger transportation from New York to Los Angeles. In January, the fare was dropped to $152.92 for the trip by air and rail. The result was a 400 per cent increase in traffic. Later, the seven cent fare was put into force and the cost raised to $181.43. The all-air service, established later in the year and found to be more popular than the air-rail arrangement, set the fare for the transcontinental trip at $200. The trip was made in 36 hours, cutting 12 hours from the air-rail schedule and more than three days from the best train time. Perhaps the most significant thing about the increase in traffic volume was that the operators did not experience a reduction in the number of passengers when the rates were raised. In fact, the number of passengers carried continued to grow until the normal seasonal decline was felt in the fall. This is demonstrated graphically in accompanying charts.

Effect of McNary-Watres Act

Without doubt, the McNary-Watres Act was responsible for the most important fundamental changes in the air transport picture during 1930. Its full effects were not expected to be felt until the spring and summer of 1931 when lines were to swing into their new schedules with smoothly operated services and good weather to stimulate their passenger business. Signed by the President April 29, the Act* provided a more equitable

* McNary-Watres Act printed in full in Appendix.
SHIPS IN THE NIGHT

With wing lights aglare and a warm glow from the passenger cabin, a Chicago-bound Ford (3 Pratt and Whitney Wasps) of N.A.T. nears its goal.

NIGHT PLANE LANDING

Curtiss Condor (2 Curtiss Conquerors) lands at night in the service of Transcontinental Air Transport. This type is being used by Eastern Air Transport along the Atlantic Coast.
basis for the payment of air mail contractors upon a space-weight per mile rate rather than on a poundage basis, previously in force. It was designed especially to stimulate the development of air passenger business, and placed a premium upon the ability of those pioneering lines which had demonstrated successful operations with passengers, in the awarding of new contracts.

Indirectly the new air mail act was responsible for the realigning of old companies into new groups, important purchases and consolidations, and a general remaking of the air mail map of the United States. To several companies, it meant a loss of revenue under a new lower rate, while others received increased compensation; and several important passenger carriers received contracts which they did not have to aid them previously. At the close of the year, there was not a single air mail contractor who was not also carrying passengers. Notable exceptions in 1929 were National Air Transport, Eastern Air Transport and Varney Air Lines. There were several important lines, however, carrying passengers exclusively, but their operators had an eye fixed on the possibility of a mail contract as new routes were established.
New York-Boston passenger plane of Colonial Air Transport flying along the Hudson River near the new bridge (right) under construction.

Ford tri-motor monoplane (3 Pratt and Whitney Wasps) of Colonial Air Transport arrives at Newark with passengers from Boston for quick transfer to New York.
Four major financial groups continued to maintain control of most of the principal air lines, but 1930 saw some important changes in the alignments. The Aviation Corporation of Delaware, one of the holding companies, operated a vast system of air transport lines through its subsidiary, American Airways, Inc., which had five divisions: Universal Division, Colonial Division, Interstate Division, Southern Division and Embry-Riddle Division. Through one of its subsidiaries, the Aviation Corporation filed a joint bid with Southwest Air Fast Express for the new southern transcontinental air mail contract offered by the Post Office Department under the McNary-Watres Act, and was successful. The contract was turned over to a jointly owned subsidiary, Southern Air Fast Express, Inc., which began operation October 15. In preparation for this service, Aviation Corporation through its Southern Division had previously purchased the assets of Standard Air Lines, a subsidiary of Western Air Express operating between El Paso and Los Angeles, and Delta Air Service, operating between Dallas and Birmingham, as well as the equipment of Southwest Air Fast Express, which had operated extensive schedules between St. Louis, Tulsa, Dallas and Kansas City.

A second grouping of interests centered around Transcontinental and Western Air, Inc., of which C. M. Keys was chairman of the board, H. M. Hanshue, president, and D. M. Sheaffer, chairman of the executive committee. Control of Transcontinental and Western Air, Inc., was shared by TAT-Maddux Air Lines and Western Air Express, Inc., each having a 47½ per cent interest. A minority interest was held by Pittsburgh Aviation Industries. Mr. Hanshue also was president of Western Air Express, Inc. Mr. Sheaffer represented the Pennsylvania Railroad, one of the largest stockholders in TAT-Maddux Air Lines, and Mr. Keys was president of North American Aviation, Inc. North American Aviation owned the entire stock of Eastern Air Transport, Inc., and controlled its operations. It was not the controlling interest in any other transport line. As an investor, it owned substantial interest in TAT-Maddux Air Lines.

United Aircraft and Transport Corporation was the third great financial group owning operating units in the air transport field. National Air Transport, Inc., previously associated with the Curtiss-Wright group, was purchased during the year through an exchange of stock, one share of United for three of N. A. T. Stout Air Lines also were acquired by purchase and later merged with National Air Transport. In the Northwest, Varney Air Lines, Inc., operators of an air mail contract from Salt Lake City to Seattle and Spokane, were acquired and closely coordinated with the Boeing System, which included Boeing Air Transport, operating the western division of the northern transcontinental route, and Pacific Air Transport, serving the Pacific Coast from Seattle to San Diego. When National Air Transport established passenger service on its route from
Chicago to Cleveland, the Universal Division of Aviation Corporation by agreement discontinued its service between those points.

The fourth air line system centered in the individuals and banking interests linked with Western Air Express and Fokker Aircraft Corporation. It owned an equal interest with Transcontinental Air Transport-Maddux Air Lines in the new operating company known as Transcontinental and Western Air, Inc., and completely controlled Western Air Express, West Coast Air Transport and Mid-Continent Air Express. This group sold Standard Air Lines to the Aviation Corporation during the year to make possible the latter's operation of the southern transcontinental mail route.

The stronger financial backing resulting from these mergers of interest was in a large measure responsible for the sound growth of the air transport lines during 1930. The "independent" lines, if operators outside these four major groups may be so identified, also were alive to the necessity for improving their services and made great strides in coordination of their schedules with other lines and in the employment of better equipment.

**Work of Air Transport Section**

Since the operators were occupied with the problems of readjustment arising out of the McNary-Watres Act during most of the year, the Air
Transport Section of the Aeronautical Chamber of Commerce concentrated its attention upon the collection of statistics, elimination of the tax on aviation gasoline, and compilation of information on the advisability of regulation of air lines by the Interstate Commerce Commission. Statistical reports were increased from a quarterly to a monthly basis toward the end of the year to give the operators a direct key to traffic volume trends.

Personnel and Equipment

The transport lines were employing an unusually high type of personnel, both in their operating and traffic departments. First-pilots or captains were men with thousands of hours of experience; co-pilots or assistant-pilots were well trained men; and stewards or couriers, employed on the longer passenger routes, were college men or women. One line insisted that its stewardesses have experience as trained nurses. Thirty-two major lines reporting to the Aeronautical Chamber of Commerce employed 2,850 persons, of whom 324 were pilots and 1,747 were mechanics or other ground personnel. The remainder were traffic solicitors or administrative executives.

The 32 lines used 642 planes during 1930, 579 of which were land
planes, 23 seaplanes and 40 amphibians. Single-engined planes outnumbered all other classes with 493, principally because of the large number of efficient mail and express planes or mail-passenger transports so equipped. Twelve had twin engines and 164 were tri-motors. Of the seaplanes, 13 were single-engined and 10 were twin-engined. Thirty-three of the amphibians were twin-engined and 17 were single-engined.

Air cooled engines predominated among the types used on lines with 902 of this type as compared with 142 water-cooled for a total of 1,044. One air cooled Diesel engine was reported in use.

New Lines Opened, Others Extended or Improved

The stories of the development of each air transport line compose a picture unprecedented in the history of transportation. While necessarily brief, it appears worthwhile to review the activities of each company. They are arranged in alphabetical order for easy future reference.

Air Ferries, Ltd., operating between San Francisco, Alameda, Oakland, and Vallejo, transported nearly 60,000 commuters since it began operations in February, and became known as the “busiest air transport line in the world.” Starting with two Keystone-Loening amphibians, popularity of the service soon necessitated the use of two more ships of the same type. San Francisco Bay was crossed 50 to 60 times a day on regular schedule,
and travel time between outlying cities and San Francisco was reduced from more than an hour to a minimum of six minutes. A three way landing ramp at San Francisco was so arranged that planes frequently discharged their loads and were in the air with a return load in two minutes. A working agreement with a cab company provided service to downtown sections of San Francisco and Oakland for a nominal sum.

Alaska-Washington Airways, flying on schedule between Olympia, Tacoma and Seattle in Washington; Victoria, Vancouver and Manaimo in British Columbia; and connecting with Ketchikan, Juneau, Skagway and other points in Alaska, carried 11,621 passengers during the first nine months of 1930. Equipment consisted of 10 Fairchild and Lockheed Vega cabin monoplanes equipped with pontoons. On February 1, passenger service to Yakima, Wash., from Seattle was inaugurated on a daily schedule. On July 1, the line was sold to a new company, taking the name of Seattle-Wenatchee-Yakima Airways, Inc. Passenger service between Vancouver and Victoria, British Columbia, was increased to two trips a day March 15. A few months later this service was increased to three scheduled trips daily. On June 1, twice weekly passenger service was extended from Seattle to Juneau, Alaska, a distance of 1,060 miles.
Lack of adequate weather reports was a serious handicap to the development of the Alaskan service. The company was installing two-way radio communication between planes and ground stations to help overcome this difficulty. It was planned to increase the Alaskan service to a daily schedule during the summer of 1931.

American Airways, Inc., operating subsidiary of the Aviation Corporation, spanned the country from New England to California. More than 50 large cities were linked with daily scheduled mail, passenger and express service over C. A. M.* 1, 2, 16, 20, 21, 22, 23, 24, 28, 29, 30, 33 and F. A. M. r.† The Colonial Division of American Airways, Inc., operated over 1,000 miles of mail, passenger and express routes between New York, Boston, Albany, Buffalo and Cleveland in the United States, as well as Toronto and Montreal in Canada, over C. A. M. 1 and 20 and F. A. M. r. Passenger service between Boston and New York using tri-motored Fords was increased from one round trip daily in 1929, to three round trips throughout most of 1930. During heavy summer traffic, four round trips were scheduled for several months. The Universal and Interstate Divisions, serving such key cities as Chicago, St. Louis, Omaha and Kansas City, were in a position to make direct connections with every air mail

* Contract air mail route.
† Foreign air mail route.
operation in the country, as well as the West Indies and South America, with two minor exceptions. Passenger operations were conducted by the Universal Division from Chicago to St. Louis, and during part of the year from Cleveland to Kansas City, as well as St. Louis to Tulsa. The Interstate Division operated air mail service between Chicago, Atlanta, Evansville and St. Louis. On April 1, night service was inaugurated on this route, and an additional day service from Atlanta to Nashville was begun. The Southern Division, operating C. A. M. routes 21, 22, 23, 29 and the new southern transcontinental C. A. M. 33, made daily contacts with 26

NEW YORK TO CHICAGO

Boeing transport plane of National Air Transport carrying mail and express from New York to Chicago in six and one-half hours.

cities in eight states. Starting at Atlanta, the network extended westward to Los Angeles, and as far south as Brownsville, Tex., on the Mexican border. Such cities as New Orleans, Houston, Dallas, and Galveston were among those receiving this daily air mail and passenger service. The contract for C. A. M. 33 was awarded to Southwest Air Fast Express and Robertson Aircraft Corporation and later transferred to a jointly owned subsidiary, Southern Air Fast Express, Inc., which began operations October 15. Southern Air Fast Express was the last link in the transcontinental chain controlled by Aviation Corporation. The new contract included a mail line between Big Springs, Tex., and San Antonio. The Embry-Riddle Division operated mail and passenger service over C. A. M. 24 from Chicago to Cincinnati, and transported mail over C. A. M. 16 from Cleve-
OVER THE NATION'S AIR LINES

land to Louisville. Passenger service was increased for several months from one round trip daily, to two. Additional passenger service also was furnished between Chicago and Indianapolis for several months. These divisions of American Airways, operating scores of planes of all types, flew more than 7,000,000 miles and carried more than 60,000 passengers and 1,000,000 pounds of mail during 1930. Alaskan Airways, Inc., also a division of American Airways, conducted operations from Fairbanks, Nome and Anchorage in Alaska, carrying mail, passengers and freight. The operation was gradually developing into a regular scheduled service between important points.

EVERY HOUR ON THE HOUR
Passengers boarding a tri-motored Stinson monoplane (3 Lycomings) at Central Airport, Camden, N. J., taking advantage of the Ludington Line's hourly service between New York and Washington.

The Boeing System, a division of United Aircraft and Transport Corporation, composed of Boeing Air Transport, Inc., and Pacific Air Transport, Inc., and operated day and night on a well lighted route of more than 3,200 miles, observed the completion of its first 10,000,000 miles of flying during 1930. More than half of this mileage was flown at night. Together, these two lines reaching from Chicago to San Francisco and from San Diego to Seattle carried 1,912,000 pounds of mail during 1930, or 23 per cent of the nation's total. This was double the amount carried in 1928 by the Boeing System. Boeing Air Transport carried more than 1,700,000 pounds of mail, gravitating to C. A. M. 18 from the great Chicago
area and feeder lines at Salt Lake City, Cheyenne, Kansas City, St. Louis and the East. More than 3,000 passengers were flown over this route during the first ten months of 1930, as well as 12,000 pounds of express. A fleet of new tri-motored Boeing biplanes, powered with Pratt and Whitney Hornet engines, were placed in service during 1930. The feasibility of night passenger service had been proved, and the new planes were used to provide for an increased public demand for the 30 hour service between Chicago and Los Angeles. Stewardesses were employed to travel aboard the tri-motored planes instead of male couriers, formerly used. The

![FAST LIGHT MAIL PLANE](image)

Stearman Junior Speedmail Model 4D, powered with a Pratt and Whitney Wasp Jr. engine, is cowled for increased speed in flight.

two-way radio system recently completed was one of the most complete in the world. Hangar depots were built at five important points along the route to accommodate passengers and facilitate travel by night along the route. A Repair depot was established at Cheyenne, Wyoming, to handle the servicing and repair of the 40 single-engined and tri-motored planes used regularly by the company.

Continental Airways, Inc., operated seven passenger Travel Air cabin monoplanes on the 300 mile trip between Chicago and Columbus. Comfortable passenger accommodations at Port Columbus awaited the traveler who transferred to the Transcontinental and Western Air line for points east and west.

Eastern Air Transport, Inc., operated C. A. M. routes 19 and 25 be-
between New York, Atlanta and Miami, Fla. Intermediate stops were made at Philadelphia, Baltimore and Washington in the North, and Daytona Beach, Orlando and St. Petersburg in Florida. During the first nine months of 1930, Eastern Air Transport flew 1,221,000 miles, carrying nearly half a million pounds of mail. In April, double service was started on the New York to Atlanta route, and two additional stops were made at Charlotte, North Carolina, and Greenville, South Carolina. The first air mail to leave Greenville set a new record for first-flight poundage, 1,067 pounds being loaded aboard the plane. Poundage records on this route were broken five times during the year, with 60,000 pounds of mail in October as the peak. Passenger service was begun for the first time, August 18, between New York and Richmond. The service was later extended to Atlanta, and was scheduled to extend to Miami early in 1931, making air travel possible from New York to South America and from New York to California by the southern route. Plans were made to equip the line with automatic gyroscopic pilots. These “robot” pilots were to supplement the work of human pilots and serve to increase the operating efficiency of the line. Equipment included four Pitcairn Mailwing and
18 Super-Mailwing planes, three Ford and two Fokker tri-motors. Of the 1,436 miles operated by the company, all but a short spur line from Daytona Beach to St. Petersburg, were lighted for night flying.

Ford Air Lines, privately owned and operated by the Stout Metal Airplane Company, a division of the Ford Motor Company, was in its sixth year of service. Since its inception in April, 1925, the line had flown Ford tri-motored planes more than a million and a half miles and carried more than 10,120,000 pounds of freight, mostly spare parts, supplies and even unassembled Ford motor cars for Ford dealers. Flying a daily schedule between Detroit and Chicago, Cleveland and Buffalo, the line completed the equivalent of 60 trips around the earth at the equator with only one serious accident. Ford Air Lines, while operated for private purposes, was so unique that it commanded a place with other transport lines.

Gorst Air Transport, Inc., flying 15 miles between Seattle and Bremerton, Wash., made 11 round trips daily with seven passenger Keystone-Loening amphibians, carrying more than 15,000 passengers and flying 75,000 miles during 1930, this short line has shown steady growth since its inauguration in 1929. A new type floating terminal was built in the center of Seattle's busy waterfront during the year, accommodating five planes, a completely equipped shop for servicing and repair, a store room, a large passenger waiting room, rest rooms, and offices. Three landing ramps permitted speedy handling of traffic during peak loads, and brought passengers close to the center of Seattle's business district. A "flag stop" service was inaugurated in early summer to serve points near the route between Seattle and Bremerton. Stops were made, on call, at any beach along the route to pick up or discharge passengers. The cost of the extra service was very nominal and increased patronage of the line considerably. Regular fares were reduced early in the year and the change met with such public approval that lower fares remained in force.

Kohler Aviation Corporation, a passenger line connecting Grand Rapids and Muskegon with Milwaukee across Lake Michigan, operated jointly with Michigan Air Express in maintaining passenger service through to Detroit. Using six place Keystone-Loening amphibians, the company maintained a schedule of three round trips daily over the 119 mile route.

Mamer Air Transport, using Ford tri-motored planes, flew a daily schedule between Seattle and Spokane, 228 miles. Passenger and express service was maintained three times weekly between Spokane and St. Paul, with stops at Missoula, Butte, Billings and Aberdeen, but was discontinued in the fall. Nearly 150,000 miles were flown and 4,000 passengers, largely between Spokane and Seattle, were carried during 1930.

The Martz Air Lines, using two Bellanca Airbuses and a Ford tri-motored plane, maintained daily service between Wilkes Barre, Pa., and
Newark, N. J., started during the summer. The service was to be extended to Buffalo in 1931. Quick connections were to be made at Wilkes Barre for Buffalo. The whole trip covering 302 miles was to be made in three hours and 15 minutes.

Mason and Dixon Air Lines, Inc., maintained twice daily service between Detroit and Cincinnati, 237 miles. Stops were made at Toledo, Springfield, Dayton and Middletown. Flamingo all-metal cabin planes were used. The service was arranged so that excellent air and rail connections were made at Detroit or Cincinnati for Chicago, New York or the West.

Radio earphones and mouthpiece are ingeniously built into the pilot’s helmet for use on the Western Air Express mail routes.

National Air Transport, Inc., a division of United Aircraft and Transport Corporation, carried air mail and express (C. A. M. 3 and 17) daily between New York, Cleveland, Chicago, Kansas City, Wichita, Tulsa and Dallas, a distance of nearly 3,000 miles. More than two million miles were flown during 1930, and planes carried 1,900,000 pounds of mail and 40,600 pounds of express. The Stout Air Lines, carrying passengers between Detroit, Chicago and Cleveland, were acquired October 1. Coincident with acquiring Stout Air Lines, passenger service on the National Air Transport mail route between Chicago and Cleveland was started. Air passenger service was extended from Cleveland to New York December 1, but the air-rail hook-up already in use on another schedule was not affected. The new line connected with westbound air lines at Chicago and provided 48 hour transcontinental air service, including an overnight stop at Chicago. Tri-motored planes capable of carrying 11 passengers and 1,000 pounds of
mail at a maximum speed of 150 miles per hour were used to fly this route. The New York-Chicago route was flown in eight hours by westbound planes, and six hours and 34 minutes by eastbound planes with the aid of the prevailing winds. Complete two-way radio installations were being placed in all planes to increase safety and insure the completion of scheduled flights, even in bad weather. Passenger service was to be extended January 2 from Chicago to Kansas City, and later to Tulsa, Dallas and Fort Worth.

National Parks Airways, Inc., operating C. A. M. 26 with daily mail, passenger and express service between Salt Lake City, Pocatello, Butte and Great Falls, Mont., improved its facilities during the year. The feeder line from Butte to Great Falls was operated only during the summer months. Sixteen intermediate landing fields on the route were completed during the year. The route for 150 miles between Salt Lake City and Pocatello was lighted by beacons every 25 or 30 miles with plans for lighting the entire line, crossing mountain ranges 10,000 feet high, in 1931. Using one Boeing, four Fokkers and three Stearman cabin planes, a total of 500,000 miles were flown during the year with 64,000 pounds of mail and 2,500 passengers. The latter represented an increase of 40 per cent over 1929. At Salt Lake City, air transportation to San Francisco, Los Angeles, Portland, Seattle and all points east was available. One-way radio communication was installed on all planes, with plans for a two-way system in 1931. In spite of severe mountain storms and the necessity of taking off and landing at altitudes of not less than 3,900 feet, the line completed 99 per cent of the mileage scheduled during the year.

New York, Philadelphia and Washington Airways opened service September 1, between New York, Philadelphia and Washington. With a fleet of eight ten-passenger Stinson tri-motored cabin monoplanes flying 11 round trips per day, a total of 4,400 miles, the line set a new pace for transport operators. This single line averaged more passengers per day than all the cross-channel lines operating out of Croydon, England, combined. Stops at Baltimore and Trenton were added November 24. From September 1 to the end of the year, the line safely flew 400,000 miles, carrying more than 15,000 passengers in maintenance of schedules "every hour on the hour." Round trip service was provided at rail-plus-Pullman fares between New York and Washington.

Northwest Airways, Inc., operated daily passenger and mail service (C. A. M. 9) during 1930, using Ford, Hamilton and Stinson planes, seating from three to fourteen passengers. Its routes radiated from the Twin Cities in all directions: to Winnipeg, Canada, in the North; Chicago, Milwaukee and Green Bay to the East; and as far South as Sioux City and Omaha. Schedules were frequent and so arranged that air-line connections for all parts of the United States and the Canadian Northwest
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<td>Kansas City</td>
<td>Omaha (via Denver)</td>
<td>168</td>
<td>P</td>
</tr>
<tr>
<td>24</td>
<td>Robert Air Service</td>
<td>New Orleans</td>
<td>St. Louis (via Chicago)</td>
<td>1059</td>
<td>MPE</td>
</tr>
<tr>
<td>25</td>
<td>Southern Air Fast Express</td>
<td>Los Angeles</td>
<td>Atlanta (via Miami)</td>
<td>715</td>
<td>MPE</td>
</tr>
<tr>
<td>26</td>
<td>Southern Air Transport</td>
<td>San Antonio</td>
<td>Houston (via New Orleans)</td>
<td>589</td>
<td>M</td>
</tr>
<tr>
<td>27</td>
<td>St Louis Air Lines</td>
<td>Chicago</td>
<td>New York (via Tampico)</td>
<td>329</td>
<td>P</td>
</tr>
<tr>
<td>28</td>
<td>Transcontinental and Western Air</td>
<td>Los Angeles</td>
<td>Columbus (via Tuba)</td>
<td>2063</td>
<td>MPE</td>
</tr>
<tr>
<td>29</td>
<td>Thompson Airspeed Corp.</td>
<td>Kansas City</td>
<td>Washington (via Seattle)</td>
<td>2564</td>
<td>MPE</td>
</tr>
<tr>
<td>30</td>
<td>Aqua California to Los Angeles</td>
<td>Los Angeles</td>
<td>San Francisco (via San Diego)</td>
<td>368</td>
<td>PE</td>
</tr>
<tr>
<td>31</td>
<td>Aqua California to Los Angeles</td>
<td>Los Angeles</td>
<td>Miami (via New Orleans)</td>
<td>120</td>
<td>M</td>
</tr>
<tr>
<td>32</td>
<td>Aqua California to Los Angeles</td>
<td>Los Angeles</td>
<td>Chicago (via Tuba)</td>
<td>272</td>
<td>P</td>
</tr>
</tbody>
</table>

**Scheduled Airway Operators**

- **Mail**: Parcels
- **Passenger**: Express
- **Express**: Express
LEGEND

- LIGHTED AIRWAYS AS OF DECEMBER 1, 1930
- AIRWAYS EQUIPPED FOR DAY OPERATIONS
- AIRWAYS UNDER CONSTRUCTION FOR NIGHT OPERATIONS
- AIRWAYS UNDER CONSTRUCTION FOR DAY OPERATIONS
- OTHER AIRWAYS

Numbers in circles indicate route operators.
Other numbers indicate air line mileage between cities.
were always available to passengers. The Ford and Hamilton planes were equipped with radio, permitting communication with the ground for receipt of weather reports.

Pacific Air Transport, Inc., a unit of the Boeing System in United Aircraft and Transport Corporation, operated mail, passenger and express service between San Diego, Los Angeles, San Francisco, and Seattle. Northbound flying time was reduced early in the year, and later the route was extended southward to San Diego, from the previous terminal, Los Angeles. A new night schedule was inaugurated on the southbound mail and passenger service from Seattle to the California cities, providing transportation without loss of business hours. Night schedules were possible by completion of the system of air beacons along the route. Radio-telephone equipment was installed in all planes, and seven ground stations were established to permit voice communication between pilots and ground stations along the route. A new permanent southern terminal was erected at San Diego during the year, as well as general improvements at all ports of call. Two Boeing 40-B-4 mail passenger planes were added to the fleet of seven planes of similar type in use. Air mail poundage showed a ten per cent. increase over 1929 and doubled that of 1928, with a total of 280,000 pounds in 1930. A new peak in passenger traffic also was reached during the year.

Pan American Airways System, operating from two bases in the United States, one at Miami, Fla., and the other at Brownsville, Tex., on the Mexican border, connected the United States with Mexico, Central America, the West Indies and South America. Its extensive activities and phenomenal expansion will be discussed in another chapter, "Latin America By Air."

Pennsylvania Air Lines, Inc., formerly known as Clifford Ball, Inc., carried mail (C. A. M. 11), passengers and express daily over the 300 mile route between Washington, Pittsburgh and Cleveland. Fairchild monoplanes accommodating six passengers were used.

Pittsburgh Airways, Inc., had flown more than 100,000 miles since March and built up its traffic from 25 passengers in March to nearly seven times that number late in the year. The route extending from Pittsburgh to New York, with a stop at Philadelphia, was 336 miles long. Two hundred and fifty-five miles of the airway, from Pittsburgh to Philadelphia, were being lighted with beacons.

Rapid Air Transport, Inc., maintained daily passenger service on the 170 mile route between Kansas City and Omaha, Nebr. Flying six place Ryan and Bellanca monoplanes, the line carried nearly 1,000 passengers during the last three quarters of 1930. On August 1, the frequency of the service was doubled and a Sunday service of one round trip added to accommodate the increasing number of passengers between these two cities.
Robertson Air Service started a daily passenger line between St. Louis and New Orleans April 27. Stops were made at Jackson, Miss., and Memphis to discharge and take on passengers. By the end of 1930, more than 1,509 passengers were transported over the 600 mile route, and the total air mileage covered by the planes was well in excess of 260,000 miles. Connections were made at St. Louis with planes traveling east, west and north. The southern points on the line provided convenient connections with planes for Los Angeles, Miami, Mexico and South America. It was planned to install radio receiving sets on all planes upon the completion of a chain of ground stations.

Thompson Aeronautical Corporation, operating largely in Michigan, and connecting Chicago, Cleveland, Detroit, Saginaw, Lansing and Grand Rapids with daily air mail (C. A. M. 27), passenger and express line, flew 756,000 miles in 1930. More than 6,800 passengers and 180,000 pounds of mail were carried, using tri-motored Ford planes. In February, a new repair station was completed at Pontiac, Mich., to keep equipment in first-class condition. Mishawaka, Ind., was designated March 5, as a regular stop for air mail planes on C. A. M. 27. The line between Detroit and Cleveland over Lake Erie resumed operations April 28, equipped with Keystone-Loening Air Yachts carrying six passengers and 500 pounds of baggage, mail and express. Four round trips a day were made between Detroit and Cleveland, requiring only 55 minutes each way. The first Diesel-powered mail plane was put into regular service June 26 between Pontiac and Chicago. Additional engines of this type were to be used if they proved reliable, safe and economical. The installation of radio apparatus on all mail, passenger and express planes was begun in October. Beginning November 11, an extension of air passenger service was made from Detroit to Buffalo. One round trip a day was scheduled over the 225 mile route, except on Sundays and holidays.

Transcontinental and Western Air, Inc., was one of the youngest operating companies in American aviation but was formed by an association of two of the oldest companies in the industry. Transcontinental and Western Air, Inc., was an operating subsidiary of Transcontinental Air Transport-Maddux Air Lines and Western Air Express, Inc., formed to carry out the air mail contract (C. A. M. 34) awarded the two parent companies under authority of the McNary-Watres Act. Operations of the new company were begun October 25, as the first operator to provide an all-air mail and passenger service between New York, Los Angeles and intermediate points. Its 36 hour coast to coast service reduced by 12 hours the fastest previous schedules, which were maintained by the air and rail connections of both T. A. T.-Maddux and Western Air Express. The route of Transcontinental and Western Air, 2,559 miles long without the 300 mile division between Los Angeles and San Francisco, followed almost
OVER THE NATION’S AIR LINES

exactly the former routes of Transcontinental Air Transport and Western Air Express, at the same time retaining the elastic rail connections of both companies. With the 36 hour all-air service and the optional 48 hour air-rail service, two transcontinental routes were flown daily. In each case the schedules provided for overnight stops in hotels. The stop was in Kansas City on the 36 hour schedules and in Amarillo on the 48 hour schedules. Transcontinental mail was carried only on the all-air service. Local mail, however, was carried between St. Louis and Amarillo on the 48 hour combination schedules. Until January 1, when completion of the lighted airway from coast to coast was planned, planes were flown in daylight hours only. Upon completion of the lighting projects, both mail and passengers were to be flown day and night to provide 24 hour transcontinental service. Passengers not desiring to fly at night were to be offered optional schedules arranged to provide for overnight stops in hotels at terminal cities. The cities on the route of Transcontinental and Western Air were those formerly served by Transcontinental Air Transport and Western Air Express, namely, Columbus, Indianapolis, St. Louis, Kansas City, Amarillo, Springfield, Tulsa, Oklahoma City, Albuquerque, Winslow, Kingman, Los Angeles, and San Francisco, with the addition of those cities between Columbus and New York included in the new all-air service. These cities were Pittsburgh, Harrisburg, Philadelphia and New York. A number of other cities were served by combination air schedules with other lines. Chicago, to cite an example, was but eight hours from New York by the combined air schedules of Transcontinental and Western Air and Continental Airways, the transfer being made at Columbus. Extensive express service was contemplated for 1931.

United States Airways, Inc., served nearly 1,000 miles of territory between St. Louis, Kansas City and Denver during 1930, and a branch line was extended as far south as Tulsa. All lines carried passengers on daily schedules and connected with other air transport lines to all parts of the country.

Varney Air Lines, Inc., a division of United Aircraft and Transport Corporation, operated daily schedules from Seattle and Portland to Spokane, via Pasco, and from Pasco to Salt Lake City, via Boise, Ida. The routes from Pasco to Salt Lake City (C. A. M. 5) and from Pasco to Spokane, and Pasco to Seattle via Portland (C. A. M. 32), carried only mail on a daily schedule in 1929. Passengers, mail and express were carried over these routes on a daily schedule at the close of 1930 except on the Portland-Salt Lake line where double daily schedules were being operated. The two mail contracts were consolidated into one (C. A. M. 5), and mail totaling 400,000 pounds was carried over the route during the year. A little less than half the 3,500 miles flown by this company daily were over a regu-
larly lighted route maintained by the Department of Commerce. All planes were equipped with two-way radio, which insured maximum safety.

Wedell-Williams Air Service, Inc., operated two passenger lines out of New Orleans. The northern line going to Fort Worth, Tex., served Baton Rouge, Alexandria, Shreveport and Dallas en route. Two schedules a day were in operation between New Orleans and Shreveport. The southern line going directly from New Orleans to Houston, via Patterson, La., was inaugurated during the summer, daily service being maintained at the close of the year.

West Coast Air Transport Corporation, closely affiliated with Western Air Express, operated daily passenger service between Seattle and San Francisco over one of the most spectacular scenic routes in the country. Regular stops were made at Portland and Montague, at the foot of Mt. Shasta in Northern California. The tourist travel to Montague was heavy enough to justify this stop as a permanent feature. Equipment consisted of three twelve-passenger, tri-motored Fokker monoplanes.

Western Air Express, Inc., continued to operate 2,000 miles of airway routes under its own name in addition to participating in the activities of the newly formed Transcontinental and Western Air, Inc. The 45 mile trip from Los Angeles to Catalina was made in Keystone-Loening amphibians in 30 minutes, as compared with an all day trip by boat and train. Landings were made at Long Beach and Avalon. A one hour trip from the airport at Los Angeles on another line brought the passengers to Tia Juana or Agua Caliente, popular Mexican resorts. Equipment consisted of a fleet of twelve-passenger Fokker monoplanes and several Fokker F-32's capable of carrying 32 passengers. Starting at Los Angeles, passengers and mail were flown daily over the deserts of Nevada and the salt flats of Utah to Salt Lake City. The trip was made in six hours and included a short stop at Las Vegas, Nev. Western Air Express, in conjunction with an affiliated line, Mid-Continent Air Express, operated another line linking Cheyenne with El Paso and Dallas in Texas. Stops were made at Denver, Colorado Springs, and Pueblo on the way south. The planes diverged at Pueblo, one line going to Dallas via Amarillo, Wichita Falls and Fort Worth, and the other to El Paso, via Albuquerque.

Western Air Service Corporation operated between Omaha and Oklahoma City, beginning in the summer of 1930. Previously, the line was known as the Brower Air Service Corporation, and operated between Wichita and Omaha, a distance of nearly 300 miles. Passengers were carried on a daily schedule between these two points until June 21, when an extension of the service was announced. Approximately 400 passengers were carried since the line was acquired by new interests. Equipment consisted of a fleet of six place Stinson-Detroiter cabin planes, powered with Wright Whirlwind 300 engines.
CHAPTER IV
LATIN AMERICA BY AIR

Pan American and New York Rio Consolidated—American Effort United—Foreign Agreements—Opening New Markets—Routes and Services of All Lines—Aircraft Factory for Chile—Military Aviation

WITH the opening of 1931, aviation in Latin America faced the most promising decade in its history after a year in which South American air transport developments exceeded in international significance the major mergers and extensions effected within the United States. Having practically no rapid transportation facilities, this great continent with its towering mountain ranges and wide expanses of impassable jungle found in the airplane a medium through which its tremendous natural resources might be exploited and its industrial life sped up to the modern cadence.

The first major American operation in Latin countries started in 1927 when Pan American Airways inaugurated a line 261 miles in length between Key West, Florida and Havana, Cuba. From this small beginning operations expanded in three years to the most extensive air transport system in the world. The purchase on September 15, 1930, by the Aviation Corporation of the Americas, of the New York, Rio and Buenos Aires Lines, Inc., gave Pan American 19,190 miles of airways, encircling South America, and traversing the West Indies, Central America and Mexico. As a result of this amalgamation, the American effort stood united.

But that consolidation, important as it was, paled beside the greater significance of the new era in South American air transport which 1930 ushered in. French, Dutch, German and British interests were definitely aligned with American. The Pan American Airways System, the name under which the Aviation Corporation of the Americas operates its totally owned Pan American Airways, Inc., Cia. Mexicana de Aviacion, S. A., and its half-owned Pan American-Grace Airways, Inc., to which the NYRBA assets were added, signed its first international operating agreement on the night of March 2. Dr. Peter von Bauer of the Condor Syndicate, Ltd., German-backed air line in Brazil, signed his name beneath that of Juan T. Trippe, Pan American's president, in New York to seal an operating agreement between the German and American interests.

The move was continued in May when Trippe went to England to bring the Imperial Airways forces into the general plan. From that meeting and subsequent correspondence came the startling announcement of a
trans-Atlantic air mail project involving Imperial Airways, the French Aéropostale, and Pan American Airways. The Condor Syndicate operating along Brazil's coast cooperated with Pan American in the development of radio communications. The Lloyd Aero Boliviano was reported to be planning a new route joining the Pacific Coast with interior Bolivia and Argentina in case the existing route from Santiago over the Andes to Mendoza should prove too difficult for faster schedules. In May, the French made a public statement that they would grant flying privileges over their colonies.

**LINDBERGH OPENS NEW LINE**

Sikorsky Amphibion (2 Pratt and Whitney Wasps) used by Col. Charles A. Lindbergh in inaugurating new Pan American route to Panama.

South Atlantic Air Mail

Across the South Atlantic, European nations tapped the rich markets of South America. From Dakar, Africa, French cruisers sped the mails to Natal, Brazil, where French pilots flew them on to Buenos Aires. It took eleven days for the trip from Europe's cities. The Graf Zeppelin was preparing for its South Atlantic flight. The German Luft Hansa had tied in with the German Zeppelin interests, and Spain had interested itself with the Germans. A French-Portuguese alignment obtained exclusive aviation rights in the Azores. Jean Mermoz and his comrades were grooming their plane for the first South Atlantic air mail flight. Newspapers wrote of a race between the German-Spanish interests and the French-
Portuguese group. But there was no race. Mermoz landed at Natal, May 13, and Paris mail was in Buenos Aires the next day, four days after posting. The Graf Zeppelin left for South America on the 18th. On the 21st it was over the Cape Verde Islands, and by radio received permission to fly over the French and British possessions in Latin America. On the 22nd, it was at Pernambuco, Brazil, since named by Dr. Eckener as the destined terminus for South Atlantic dirigible service.

To connect the United States with South American cities via the Atlantic Coast, NYRBA started a weekly passenger and cargo service south from Miami to Buenos Aires using the newly designed Commodore flying boats. To speed up mail deliveries the United States Post Office Department advertised for bids on an east coast route. This United States air mail contract could be let at a maximum of two dollars per mile. Competitive bidding might force the award down to costs or less than costs, and the American effort in South America would be weakened, a powerful argument for the Pan American-NYRBA consolidation which later took place.

In the meantime Pan American Airways opened a northbound mail service from Santos and Rio connecting with existing air mail routes at Paramaribo. The Post Office Department then doubled its service on the west coast. It was obvious that twice weekly air mail service from the
principal cities of the United States to and from Buenos Aires and Montevideo in seven days was better than an uncertain four day trans-oceanic flight from Europe. In order not to split the Post Office support by dividing air mail contracts between competing American companies, unification of American lines was proposed.

**Negotiate for Consolidation**

A long series of negotiations between the two American companies followed, with Juan Trippe representing Pan American and William P. MacCraken, Jr., representing the NYRBA line. Newspapers reported false stories of the consummation of a deal again and again. Until the end of August, the two groups of officials discussed price and terms. When completed and finally announced, the trade was not a merger, as originally reported, but a purchase of NYRBA assets.

Meanwhile work had gone ahead looking to the operation of an air line into Jamaica. Pan American representatives spent July at Kingston. During the fall, repeated announcements of air connections to Cuba were printed in the British and American press. Finally, on the heels of the announcement of an agreement for trans-Atlantic air mail service, came
FLYING DOWN FROM RIO
Headed for Santos from Rio de Janeiro along the Brazilian coast, the American passenger witnesses a brilliant sunset on the sea.

BARRANQUILLA'S SEAPLANE BASE
Main operating base of "Scadta" in Colombia for its Magdalena River and Inter-Ocean lines, showing the types of seaplanes in use.
confirmation of the new route by way of Jamaica to the Canal Zone to be opened December 2 on a twice weekly schedule both ways, carrying United States air mail.

The year 1931 must see many things develop which were started in 1930. Most important of all was the psychological change in the way of handling the problem. While previously air lines had secured their subsidies on the basis of an international battle for markets, the American interests as represented by Pan American Airways have chosen the much more daring, but economically sounder, basis of cooperation with all reputable air transport groups for the development of international air transport. By joining all air lines, a system is created linking all countries. It remains only for the shrewd American business man to utilize this superior mode of transportation more effectively than his competitors in other countries.

Whether there will come, from the common ground of air transport in Latin America, a coordination of all world air transport remains to be seen. Clearly this dream of a few men has taken on many aspects of reality. On this romantic and adventurous background, let us project the facts and figures of air transport in Latin America as it exists today.

**Pan American Airways System**

The Pan American Airways System is the holder of the United States Post Office Department Foreign Air Mail contracts numbers 4, 5, 6, 7, 8, 9, 10 and extensions, which cover the transportation of mail from the United States to Latin American countries. Routes 5 and 8 merge into one at San Salvador, as will be seen from the accompanying map, and continue southward to the Canal Zone. The extension from Cienfuegos (Cuba) to Kingston (Jamaica) was opened December 2 and another extension from Venezuela to Trinidad was contemplated, completing two great circles of rapid transport with points of coincidence at Cristobal, C. Z., and Port of Spain, Trinidad. The system was so flexible that in case of a rupture of operations at almost any point, traffic between North and South America could be rerouted.

During 1929 and 1930, the Pan American lines were increased rapidly to 19,190 miles, a phenomenal growth. Pioneer companies' lines had been acquired and reconstructed and new routes had been placed in operation until the company's records showed on September 1, 1930, that 5,344,447 miles had been flown since January 1, 1929. In this period, 39,727 passengers, 1,022,730 pounds of baggage and more than 880 tons of air mail had been transported on the international routes with northernmost terminals in Brownsville, Tex., and Miami, Fla., and southernmost extremities in Montevideo, Uruguay, and Buenos Aires, Argentina.
It should be interesting to review the growth and history of some of the other air transport interests in Latin America, representing the ambitions of France, Germany, Great Britain and the nationals of South America to establish new routes in this sphere.

American Influences

The Faucett Aviation Company of Peru, organized in 1920, bears the name of an American who carried on air transport and photographic business almost single-handed until April, 1929, when a North American aviation interest joined forces with him and enlarged the organization. Passengers, mail and express are carried by this pioneer company over 1,200 miles of routes in Peru, connecting Arequipa, Mollendo, Ica, Lima, Chimbote, Trujillo, Pacasmayo, Chiclayo and Paita.

The Corporación Aeronáutica de Transportes, S. A., (Aeronautic Transport Company) was organized with aid from American interests to use speedy Lockheed monoplanes on an air mail, passenger and express service southward from Nogales, Juárez and Matamoras on the U. S.-Mexican border to Mexico City and a transcontinental air route between Matamoras
and Mazatlán. The latter route was inaugurated March 9, 1929, on a bi-weekly basis, and the Juárez and Nogales routes to Mexico were initiated August 17, 1929. Both have since been increased to a daily service between terminals within 12 hours. The 2,087 miles of routes flown include: Matamoros to Mazatlán, 638 miles; Juárez to Mexico City, 1,104 miles; and Nogales to Chihuahua, 345 miles.

The Compañía Aérea Hondureno (Honduran Air Company) was organized in 1928 in the Republic of Honduras as the air transport subsidiary of the United Fruit Company, and transports passengers, mail and express over the Tela, San Pedro, Tegucigalpa route, a distance of 166 miles.

GERMAN AIR LINER OVER RIO
Dornier Wal flying boat of the Condor Syndicate flying over Rio de Janeiro after a flight from Rio Grande do Sul along the coast.

Isthmian Airways, Inc., using Hamilton metal planes, inaugurated a tri-daily service, May 5, 1929, for passengers and express in the Canal Zone over the Panama Canal route from Cristobal to Balboa, a distance of 47 miles.

French Back Line

The Compagnie Générale Aéropostale was an outgrowth of the Latécoère Airlines, which started operations December 15, 1918, as the result of the first scheme presented to the French government for linking Europe, Africa and South America by air. The plan was presented two months before the World War armistice was signed by P. Latécoère. The Aéropostale was organized April 21, 1921, under the laws of France and took
over the Latécoère lines. The Buenos Aires-Natal route was placed in operation November 15, 1927, and on March 1, 1928, the air mail was carried from Natal by fast steamers to Dakar, Senegal, Africa, thence by plane to Paris in a total of 17 days. This service has been improved until the trip was made from Toulouse to Buenos Aires in nine days and Mermoz flew one shipment of mail across the Atlantic from Paris to Argentina in four days. The Compagnie Générale Aéropostale conducts a weekly service between Natal, Buenos Aires, and intermediate points, 2,895 miles, and between Maracaibo and Maturin, Venezuela, 689 miles, under its own name. A subsidiary, the S. A. Aeroposta Argentina operated in Argentina between Buenos Aires and Mar del Plata, 240 miles; Buenos Aires and Rio Gallegos (bi-weekly), 1,650 miles; Buenos Aires and Asuncion, Paraguay (bi-weekly), 690 miles; and Buenos Aires and Santiago, Chile (weekly), 750 miles.

The Sociedad Colombo Alemana de Transportes Aereos in 1924 carried on a great amount of aerial mapping over unexplored territory in the Republic of Colombia. Because the original and main route of the company extended along the Magdalena River, and later extensions were projected chiefly along the coast of Colombia, seaplanes were selected as
the flying equipment and they still form the bulk of the company's operating equipment. The passenger and mail routes of the Scadta company, totaling 2,440 miles, included: Barranquilla to Bogota (daily), 650 miles; Barranquilla to Guayaquil, Ecuador (weekly), 1,200 miles; Santa Marta to Cristobal, C. Z., 500 miles; and Bogota to Ibague across the Andes (bi-weekly), 90 miles. The Cosado (Compania Santandereana de Aviacion), a subsidiary, was liquidated in 1930. Fourteen seaplanes and six land planes were operated by the Scadta.

**Peru, Chile and Bolivia**

An American Naval Air Mission sent to Peru played a large part in the establishment of the Peruvian Naval Air Service in 1926, connecting the isolated portion of Peru east of the Andes with the Pacific slope. Passengers, mail and express were transported over routes totalling 1,100 miles, including: Puerto Bermudez to Iquitos, 800 miles; and Moyabamba to Iquitos, 300 miles.

The Chilean National Air Lines is a passenger, mail and express service maintained by the Chilean government and operated by the Chilean War Department between Arica, Puerto Montt and Magallanes, 2,900 miles.

The Compania Lloyd Aerea Boliviano was established in August, 1925, and in 1930 operated a system of seven air lines wholly within Bolivia.
Passengers, mail and express were carried over the routes totalling 2,264 miles, including: Cochabamba to Santa Cruz, 274 miles; Santa Cruz to Puerto Suarez, 469 miles; Sucre to Cochabamba, 150 miles; Santa Cruz to Yacuiba, 375 miles; Cochabamba to Todos Santos, 135 miles; Riberalta to Todos Santos, 625 miles; and Cochabamba to La Paz, 236 miles.

The Condor Syndicate, Ltd., was organized in May, 1924, by Capt. Fritz Hammer, Dr. Peter von Bauer and financial interests of Hamburg, Germany. The original plan was to establish an air mail and passenger service from Colombia and the Canal Zone through Central America to the United States. Two large Dornier Wal seaplanes were constructed especially for this service and in August, 1925, they were flown from Barranquilla, Colombia, to the Canal Zone and through Central America to Havana, Cuba. As a pioneering flight the project was highly successful, but an attempt to obtain financial backing for the intercontinental project in New York was in advance of the public's acceptance of international air transport. The company then turned its attention toward South American-European service. A mail, passenger and express line was opened in 1927 between Rio de Janeiro and Porto Alegre. The Varig (Rio Grande Airways Company) is a subsidiary of the Condor Syndicate operating between Porto Alegre and Rio Grande do Sul. The lines were extended northward February 15, 1930, to Natal, Brazil.
March 27, the line was extended from Natal over water to the Island of Fernando de Noronha. The mail was transferred here to fast steamers bound for the Canary Islands, where it was turned over to airplanes and flown to various European points over the Luft Hansa lines. A further improvement contemplated replacing the steamers by airplanes. The Condor Syndicate operated 2,992 miles of routes including: Rio Grande do Sul to Rio de Janeiro (weekly), 935 miles; Rio de Janeiro to Fernando do Noronha (weekly), 1,511 miles; and Rio de Janeiro to Corumba, Brazil (weekly), 546 miles.

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**FLYING LEATHERNECKS**

Rough fields mean nothing to these U. S. Marine Corps fliers who pilot Vought Corsairs (Pratt and Whitney Wasps) in Nicaragua.

From this summary of the activities of the principal companies operating regular air line service in Latin America it can be seen that 41,294 miles of air routes are flown regularly. Pan American Airways System, flying 19,190 miles of this total, was by far the largest single operator in the world.

**Radio Welds System Together**

Radio communication was playing an important part in welding together these far flung air transport systems in South America. Most air lines in the Caribbean, Central America and the east coast of Brazil had excellent radio telegraph facilities. The Pan American Airways System
operated its own radio communication system from 48 ground stations. Over this network, weather reports were flashed to planes in the air along the routes.

Aside from a small number of airports which have been established by the war departments of the several countries, the task of providing commercial airports has fallen squarely upon the air transport companies. Operations along the east coast of South America and in Colombia are chiefly confined to water landings, but in Mexico, Central America, the West Indies, the west coast of South America, Argentina and Venezuela,

landing fields have been established or were under construction. Of the 200 airports in Latin America, 72 of them were leased or owned by the Pan American Airways System.

Chile has been one of the most enterprising countries in Latin America so far as the development of aviation is concerned. Just as in 1929, Chileans found a network of national air lines to serve them in the central and northern sections of the country, with airport facilities in all leading cities and Santiago the southern terminus of the longest air line in the world, so in 1939 Chileans again had their national pride bolstered when an airplane factory was established near Santiago. Chileans have long been recognized
as the foremost mariners of South America, and are determined to become the foremost mariners of the air as well as the sea.

The factory, the property of the Curtiss-Wright Export Corporation, was constructed upon the invitation and under a concession of the Chilean government at a cost of $750,000. Work on the first airplane to be manufactured in the plant was formally commenced October 16, 1930. President Ibañez, the genial strong man of the republic, assisted at the opening ceremonies.

**TYPICAL "SCADTA" BASE**

Seaplane bases at Buenaventura, showing ramp, used by the Sociedad Colomba Alemena de Transportes Aereos in Colombia.

**Chile Orders Military Production**

The Chilean government awarded the factory an initial order for 20 military planes of the Falcon type, which was to be followed by a similar order for an equal number of Hawks and Fledglings. The production of commercial planes was to be undertaken before the end of 1931. The factory is located at the commercial airport of Los Cerrillos, near Santiago, and has a capacity of 50 to 60 planes a year. Engines were to be imported from the United States.

Under the terms of its concession, the Curtiss-Wright Export Corporation is obliged to employ Chilean workmen and Chilean materials so far
as possible, and 25 Chilean mechanics were given an intensive training course in the United States to prepare them for this work.

During the first nine months of 1930, the Chilean National Air Lines flew approximately 225,000 miles; Pan American-Grace flew about 100,000 miles in Chile; members of the Club Aero de Chile, 250,000 miles; and the Compagnie Générale Aéropostale, 10,500 miles in Chile. Thirty planes, 20 pilots and 35 mechanics were in the Chilean service of these lines, giving some indication of the extent of air transport operations in this far South American republic.

No doubt, other aircraft factories will be established under government concession at important centers in Latin America, but with the exception of the planes produced by the Chilean factory and in small military aircraft plants in Argentine and Mexico, all aircraft used in South America has been imported, principally from the United States, Germany, France and Great Britain. The export divisions of United Aircraft and Transport Corporation, the Curtiss-Wright Corporation, Aviation Corporation, Detroit Aircraft Corporation and Great Lakes Aircraft Corporation particularly interested themselves in the possibilities of this field during 1930, several of the companies sending representatives into the territory or entertaining missions from the Latin American governments. Sales of American aircraft in South America, one of our principal export markets, can be seen at a glance from the tables of aircraft, engines and accessories exported during 1930 printed in the Appendix.

Problems of Exporter

The American exporter making sales in Latin America must expect to do far more than is necessary in making a domestic sale. He must provide a means of training the purchaser's pilots to use the planes and then plan a method of servicing the planes. The market for airplanes among trained pilots in Latin America is too small to be considered. The exporter must sell the government or operator and then proceed to train their personnel.

There are few flying schools in Latin America where students may receive training. Most of the pilots have been trained by American, German or French missions sent into the country under an agreement to train the necessary personnel to pilot new planes purchased. In some sections, schools were being organized. Plans for the completion of the Chilean airport at Los Cerrillos called for the establishment of a commercial flying school there in 1931. In Havana, the Cia. Cubana de Aviacion Curtiss offered flight training along with its charter and sightseeing service, and the Cuban Army Flying School trained eight pilots during the year. The aviation school at Santo Domingo in the Dominican Republic
was destroyed by hurricanes which swept the country in 1930. In Guate-
mala, two students were under instruction of the Compagnia Nacional de
Aviacion, and one soloed. Generally, however, flying instruction was con-
fined to the army and navy establishments of the several governments.

Aviation was playing an increasingly important part in the military
services of Latin America, and several major skirmishes during the South
American revolts of 1930 were aided by use of aircraft which routed
ground forces of the opposing army. Many of the airports in South
America were military airdromes or were controlled by the war depart-
ment. Two military flights by Latin American officers during 1930 spurred
a nationalistic interest in aviation. Commander José Estremaduro of the
Peruvian Air Service flew from Iquitos to Manaos, Brazil, and return over
densely forested country, and Capt. Benjamin Mendez, American-trained
Colombian pilot, flew from Bogota, Colombia, to Quito, Ecuador.

Military Aviation Develops

Chile had one of the largest aviation units in South America with
more than three score planes in service. Mexico also had more than
60 planes in its air force. Peru had 33 planes in its military estab-
lishment, 20 at the Jorge Chavez military base and 13 in naval avia-
tion. The government of Paraguay owned 33 planes, all of which were
used for military purposes, eight of them for training. Uruguay's naval
aviation service, which previously existed only on paper, came into reality
during 1930 when three planes were purchased and the training of several
naval pilots started. Equador's aviation corps had two American observa-
tion planes in its service. The United States Marine Corps, occupying
Haiti under terms of the treaty of 1915, operated six planes for military
purposes and maintained landing fields at Port au Prince and Cape Haitien.
The Marines and the Pan American Airways contributed largely to the
relief of Santo Domingo following the hurricane in September, carrying
medical supplies, doctors and nurses to the stricken area. Nine airplanes
were in the service of the Guatemalan air corps, while El Salvador had
six planes in its military service. Argentina and Brazil both maintained
aviation units in their armies. The Cuban Army Air Corps had 19 Ameri-
can military planes in service. Just as in the United States military aviation
and organized commercial air transport are the backbone of aviation, so
in Latin America they are responsible for the awakening of the public to
possibilities of flying.

The air transport lines are breaking down nationalistic boundaries and
are bringing the peoples of the various countries into closer social and
business relations with each other. Journeys which previously required
weeks or a month are now made in a day. The result is stimulated busi-
ness activity in Latin America, toward which American business and enterprise are turning an attentive eye. The markets of South America are brought as close to the New England manufacturer as our own Pacific Coast, and new trade territories are being developed.

Aviation and especially air transport has a strong foothold in Latin America. The year 1931 should see a rapidly expanding volume of business for these lines as "Latin America by Air" becomes commonplace for the American business man and South American traveller alike.
NAVY'S SKY QUEEN

With towering skyscrapers reaching up into the sky beneath it, the U. S. S. Los Angeles flies serenely over lower Manhattan headed west.

BUILDING NEW DIRIGIBLE

First gas cell for the U. S. S. Akron, world's largest dirigible under construction for the Navy, has capacity of 950,000 cubic feet.
CHAPTER V

PROJECTED WORLD AIRSHIP SERVICES


LIGHTER-THAN-AIR activities promised to share a large part of the attention given to aviation during 1931, as plans for projected world airship services advanced nearer the stage of realization. The world's largest dirigible, the U. S. S. Akron, was near completion in the Goodyear-Zeppelin dock at Akron under contract for the United States Navy. The Graf Zeppelin added to its international fame in 1930 through a highly successful four-continent flight. The R-100, Britain's sky queen, completed a round trip across the Atlantic to Canada and was ready for further flights to frontiers of the Empire. The U. S. S. Los Angeles piled up additional hours to its impressive record, which represents a longer period of service than any other rigid airship ever built. The R-101 disaster failed to shake America's confidence in the future of lighter-than-air craft and served to emphasize the importance of helium for inflation of future ships and the value of America's World War heritage in the acquisition of German engineers experienced in the design of great airships. Success of the first metalclad airship ever built prompted the proposal of a new 100 ton metal airship for the United States Army.

Late in 1929, two companies whose aim is the development of worldwide commercial transportation with rigid airships were organized under the laws of Delaware. The International Zeppelin Transport Company, in which are both American and German interests, is looking toward the establishment of a trans-Atlantic line, while the Pacific Zeppelin Transport Company, an entirely American organization, expects to establish a line extending from the west coast to the Hawaiian Islands and the Philippines, and eventually to the Orient.

The McNary-Parker bill before Congress would provide legal status for commercial airships in international commerce, and authorize letting of mail contracts. Upon its adoption depends to a great degree the early beginning of world airship service, lighter-than-air experts said.

During 1930, engineers of the International Zeppelin Transport Company and the Pacific Zeppelin Transport Company were gathering data regarding possible terminal sites on both the east and west coasts of North
America, and on operating costs. It was expected that ships of 6,500,000 cubic foot capacity, the same size as the ship now being built for the Navy by the Goodyear-Zeppelin Corporation, would be used in the trans-Atlantic and trans-Pacific services.

Banking, steamship and aircraft interests, as well as the Goodyear-Zeppelin Corporation, are represented in the International Zeppelin Transport Company. Among them are: the National City Company, Aluminum Company of America, United Aircraft and Transport Corporation, Union Carbon and Carbide Company, Grayson M-P Murphy Company, Lehman Bros., Goodyear Tire and Rubber Company, Luftschiffbau-Zeppelin and a group of German banks.

PROJECTED WORLD AIRSHIP SERVICES

Company; Walter Dillingham, Honolulu; Harry Chandler, Los Angeles Steamship Company; C. M. Keys, Transcontinental and Western Air, Inc.; J. A. Talbot, Western Air Express and Fokker; Juan T. Trippe, Pan American Airways; Graham B. Grosvenor, Aviation Corporation; and Edward P. Farley, American-Hawaii Steamship Company.

Great Britain is known to be contemplating the establishment of inter-dominion lighter-than-air services, with routes to Canada and India certain to have first consideration. Russia was identified with rumors of negotiations with German Zeppelin interests to build a ship for operation between Berlin, Moscow, Yakutsk and Vladivostok, on the Pacific coast of Siberia. The Germans would build the first dirigibles, and Russia would enter construction of its own ships later. Japan was linked with plans for world airship services when Toyoji Keneko, acting consul general of Japan, announced that a $15,000,000 Japanese company had been formed to operate a 68 hour dirigible service between Tokio and San Francisco. He said Japan was negotiating for the purchase of three German airships to cost $1,500,000 each. Acquisition of a large tract of land near Tokio for a base was authorized.

Analyzing the costs and potential revenues of an airship service between Great Britain and the Western Hemisphere across the North Atlantic, Sir C. Dennis Burney, designer of the R-100, holds that profitable operation of such a line is possible. He made a detailed report to the
British government, conservatively estimating possible revenues and costs of operation based on present day experience. He suggested that four dirigibles be used in a twice-weekly service to provide sufficient regularity to make it attractive to trans-Atlantic passengers.

Compared with the steamship Leviathan, a 300 ton airship, twice the size of the R-100, would transport 21 per cent of its gross displacement in pay load in addition to 50 per cent fuel reserve and a crew at from 70 to 80 knots, while the Leviathan fully loaded carries only four per cent of its gross displacement in pay load at 24 knots.

The giant dirigible Los Angeles dwarfs the Vought Corsair hooked onto a trapeze beneath it in flight near Lakehurst.

"Akron" Nears Completion

The year 1930 saw rapid strides in the construction of the ZRS-4, the 6,500,000 cubic foot rigid airship being built at Akron for the U. S. Navy by the Goodyear-Zeppelin Corporation. With actual assembly of the frame just begun as the year 1930 opened, the ship has taken shape and more than 700 feet of the framework had been erected at the close of the year. The nose was in place January 1, leaving but 85 feet of the after-portion of the craft to be constructed.

The Navy Department formally named the ZRS-4 the "U. S. S. Akron", in recognition of the place held by that city in fostering lighter-than-air throughout the years. Public interest in the construction work has grown
steadily since the framework began to reveal the immensity and beauty of line of the "Akron." Thousands of visitors have filed through the dock, which is the largest structure in the world without internal support, and was completed in January, 1930.*

Work on the control cabin was well under way by the end of the year, while construction of gas cells and outer covering for the ship had begun. The control cabin will be the only portion of the ship extending outside the hull, as the motors are housed inside, with power being delivered to propellers mounted on outriggers through a specially designed bevel gear device. Installation of the motors inside the hull itself eliminates the necessity of suspended gondolas as in past practice. This is made possible through use of helium, the non-inflammable non-explosive lifting gas found only in America, and through the added strength given by the triple keel system built into the structure.

Motors Are Tested

There will be eight motors totaling 4,480 horsepower on the "Akron," and these have been received and have been tested in a replica of the ship's motor rooms. The power transmission device, which allows the

* For description of dock, see "The Aircraft Year Book for 1930."
propellers to be tilted on their axes through a 90 degree arc, making it possible for them to be used in a vertical as well as horizontal direction, has also been thoroughly tested by both Navy and Goodyear engineers during the year.

On Navy Day, October 27, school children of the city of Akron presented to Rear Admiral William A. Moffett, chief of the Navy's Bureau of Aeronautics, a silk flag, to be the "Akron's" official colors. At that time, crowds estimated at 50,000 were present.

The "Akron" was designed by Dr. Karl Arnstein, vice-president of the Goodyear-Zeppelin Corporation, who designed and constructed more than 70 of Germany's war time Zeppelins. The general superintendent of construction is W. H. Collins, who formerly held a similar post with the Bethlehem Shipbuilding Corporation, while Z. W. Wicks is erection superintendent. Wicks was formerly a commander in the Navy, and was at one time in charge of the government's helium plant at Amarillo, Texas, and later executive officer at the Naval Air Station at Lakehurst, N. J.

**Non-Rigid Ordered by Navy**

A new non-rigid airship, the largest of this type ever built in the United States, was under construction for the United States Navy for use in re-
search to develop a fuel gas which may replace gasoline. The envelope for the new ship, which will have a gas capacity of 320,000 cubic feet, was being built at Akron by the Goodyear-Zeppelin Corporation, while the car was being constructed at the Naval Aircraft Factory in Philadelphia. The new ship will be one and one-half times as large as the biggest blimps now operated by the Navy, the J-3 and J-4, and will be twice the size of the largest commercial non-rigid. The new airship will be 200 feet long and 54 feet in diameter.

Use of a fuel gas of the same density as air has long been desired by lighter-than-air engineers since it would obviate the necessity of water recovery which is now required to maintain equilibrium and to conserve the valuable helium lifting gas. Development of a fuel gas to replace gasoline has previously been strictly a German development resulting in the use of “Blau gas”, named for its inventor, Dr. Blau, in the Graf Zeppelin. The Navy also experimented with a mixture of hydrogen and helium, and it was found possible to use up to 14 per cent of hydrogen in the mixture and still maintain the non-explosive characteristic of the gas. While no conclusive result was announced, it was found that the hydrogen mixture provided better lifting power and was considerably cheaper than pure helium.
The dirigible "Los Angeles" was used during 1930 in extensive tests of new devices to be incorporated in the dirigible "Akron," and in the development of knowledge in the mechanical handling and mooring of rigid airships. A Navy board assigned to the task of examining the "Los Angeles" in November, 1930, reported that the dirigible should last from two to four years longer. Having flown 110,000 air miles and having spent 1,200 hours at mooring masts, the "Los Angeles" passed through a useful life greater than that of any other rigid airship known to date. It was flown across the Atlantic by Dr. Hugo Eckener after being completed in 1924 at Friedrichshafen under terms of the Versailles Peace Treaty.

METALCLAD KEEPS PACE
First metalclad airship of the U. S. Navy, the ZMC-2, flying in formation above the stern of the Los Angeles and one of the Navy blimps.

The possibilities of launching gliders from airships in flight were demonstrated in January by Lieut. Ralph S. Barnaby of the Navy when he left the dirigible "Los Angeles" near the Naval Air Station at Lakehurst and after 12 minutes of gliding landed at the station. Lieut. C. M. Bolster had previously left the "Los Angeles" in an airplane which had been hooked onto the dirigible in flight by Lieut. A. W. Gorton. The tests were made to study problems concerned with the new Navy dirigibles which will house five planes in their hulls, launching them from a trapeze through
a door in the bottom of the airship and hauling them back in after their mission has been completed.

The Graf Zeppelin, Germany's latest rigid airship, added to its laurels during the year with a flight from Europe to Africa, South America, North America and return to Friedrichshafen described in the chapter on "History-Making Flights of 1930." Finishing its 1930 flying season late in November, the Graf was deflated and given a thorough overhauling during the winter months. Since it was placed in service, the Graf Zeppelin has made 155 flights, covered 144,375 miles, has carried 6,278 passengers, 12,000 pounds of freight and 18,000 pounds of mail and has earned enough to pay for fuel, wages for her crew, insurance and depreciation.

**LZ-128 Construction Halted**

Dr. Eckener halted construction on the Graf's sistership the LZ-128 early in November, 1930, and announced that it would be redesigned in view of the R-101 disaster so that the new ship will use helium imported from the United States. The LZ-128 was to be completed in 1931, but two years work must be undone to complete the redesigned ship. The ship was to be ready by 1932 under the new plan.

The LZ-128 was to be somewhat larger than the Graf Zeppelin measuring 815 feet in length and 130 feet in diameter as compared to the Graf's 775 foot length and 90 foot diameter. The displacement of the new dirigible was to be 5,250,000 cubic feet as compared to 3,877,000 cubic feet for the Graf. Crude-oil motors will drive it through the air instead of engines using Blau gas. Use of helium was expected to increase its new size substantially.

The British R-100, the largest rigid airship in the world at the close of 1930, had successfully completed her first mission, a round-trip flight to Canada from England. Details of this journey are described in the chapter on "History-Making Flights of 1930." Her sistership, the R-101, patched up by the addition of a section amidships to give her greater lifting power, was not so fortunate, crashing near Beauvais, France, on a flight to India with the loss of her crew and a distinguished group of passengers. The British Court of Inquiry had not yet presented its report at the close of the year. David S. Ingalls, Assistant Secretary of the Navy for Aeronautics, commenting upon the disaster, said that it would not in any way affect the Navy's policy toward lighter-than-air. He added that he hoped the knowledge which may come through the disaster may be a means of great saving of life and property in the future.

The Metalclad Airship ZMC-2, built for the United States Navy by the Aircraft Development Corporation, a division of the Detroit Aircraft Corporation, was in service throughout 1930, using the Naval Air Station at
Lakehurst, N. J., as its base. During the sixteen months of its operation, it was flown more than 300 hours and, according to naval officers, functioned satisfactorily as an experimental and training ship. It was reported that the ship had come up to expectations, that it has high structural strength and maneuverability, and has demonstrated its ability to retain helium with less leakage than fabric covered airships of similar size.

The ZMC-2 has a capacity for 200,000 cubic feet of helium and is powered with two air-cooled engines totaling 450 horsepower, giving it a top speed of approximately 70 miles an hour. The only change in the ship since its delivery to the Navy was the substitution of a landing wheel underneath the pilot’s cabin for a skid originally used.

The hull covering the ship consists of thin aluminum alloy sheets .0095 inch thick. Hence the name Metalclad. The seams of these sheets are gas tight, the metal hull thus serving as a direct container for the buoyant helium gas as well as carrying all shear stresses and to a large extent the tensile stresses also. The entire outer surface of the metal hull was thoroughly examined and no corrosion or deterioration of any consequence was
discovered. The metal covering was slightly tinted by oxidation, giving it the appearance of a metal airplane under a similar length of service.

100-Ton Metalclad Proposed

Utilizing the engineering development and experience gained from the construction of the ZMC-2 as a basis for research and investigation, the engineering department of the Aircraft Development Corporation was engaged during 1930 in the design of a 100-ton, 100-mile-an-hour Metalclad airship suitable for either military or commercial use. The Vandenburg-
40,000 pounds of military load from Washington to Panama in 30 hours at a cruising speed of 80 miles an hour.

It was pointed out by the designers that this ship would be valuable not only from a military standpoint, but it would also furnish a technical demonstration of large metalclad airships, thus laying the foundation for the commercial utilization of similar size ships operating from the United States to the important sea coast cities of Central and South America.

The metalclad airship is distinctly an American development. The success of the first unit, the ZMC-2, has stimulated world wide interest in engineering circles as to its possibilities.

Blimps Pile Up Record

An impressive record for hours flown, miles covered and passengers carried was set up during 1930 by the six non-rigid airships of the Goodyear-Zeppelin Corporation, the only lighter-than-air ships operating commercially in the United States.

The fleet consisted of the Defender, Puritan, Volunteer, Mayflower, Vigilant and Pilgrim. The Pilgrim, smallest and first of the six to be built, made its first flight in 1925 and has been in operation ever since. In 1930, more than 35,000 people were carried by the fleet in various sections of the country, while a total of more than 6,000 flying hours was piled up. It was estimated that the ships flew 300,000 miles during the year. Not a single flight accident resulting in injury or death of passengers or personnel was incurred in making this record.

New Lighter-than-Air School

Of great interest to aviation during the year was the announcement of a bequest by the Guggenheim Fund for the Promotion of Aeronautics for the establishment of the Guggenheim Foundation for Lighter-than-Air Research. The University of Akron, at Akron, Ohio, was granted $175,000 for carrying out this work. Of this sum, it was specified that $120,000 be used to cover the costs of operation for five years, while the remaining $55,000, together with an additional sum of $100,000 secured by bonds voted by citizens of Akron, was to be used for construction and equipment of a building in which the research work will be conducted.

A site has been selected and plans for the building are being drawn up with construction work due to begin in the spring of 1931. Actual operations are to begin in September, 1931, with Dr. von Karmen of California Tech. as director. The California Institute of Technology was granted $75,000 for furthering lighter-than-air research by the Guggenheim Fund and the University of Akron is to work in conjunction with California Tech.
CHAPTER VI

A'WING WITH THE ARMY AIR CORPS

Thirty-two Million Miles Flown in 1930—Squadron Flies in Formation Six Miles High—War Games Illustrate Efficiency—"Robot" Flies Bomber—New Aircraft Ordered—Five-Year Program

THE United States Army Air Corps, flying more miles during 1930 than any other single organization in the world, continued to develop the efficiency of its operations as an important link in the national defense. The Army Air Corps covered a wide range of activities in the execution of which 32,500,000 miles were flown.

The annual "war games" of the Army Air Corps and special military missions carried out during each year provide a striking picture of the progress that has been made in the development of military aviation. The spectacular performance of 19 Boeing pursuit planes, powered with supercharged Pratt and Whitney Wasp engines, climbing in combat formation to 30,000 feet above Sacramento, California, April 12, was the highlight of the 1930 maneuvers on the west coast. Only a few years before, six miles above the earth was a mark for special altitude fliers to shoot at, yet in 1930 Army pursuit pilots pushed the fighting front of the air to that height and maintained communication with the ground by radio throughout the formation flight. Pilots who outclimb their opponents always have the upper hand in pursuit combat and the Army Air Corps indicated that it intended to maintain its lead in this field. The 95th Pursuit Squadron, which accomplished the mission despite temperatures of 40 degrees below zero and thin air in which the pilots were forced to use oxygen, again demonstrated its skill in a simulated attack upon Los Angeles in June.

Enemy forces had taken Los Angeles, according to the theoretical problem, and had destroyed a large portion of the business district to establish headquarters, anti-aircraft nests and an ammunition base in the heart of the city. The high command was operating from the City Hall. Preparatory to reoccupation by friendly troops, the Army Air Corps was ordered to destroy the enemy's stronghold, disorganize their forces and throw them off their guard for an attack by friendly Infantry. Six giant Curtiss Condor bombers, powered with Curtiss Conqueror engines, were dispatched by the 11th Bombardment Squadron from San Diego, flying at an altitude of 15,000 feet, loaded with bombs, and protected by the 95th Pursuit Squadron flying from five to six miles above the earth. The little single-seater fighters could not be heard or seen from the ground. It was the
first time in history that an air squadron was to launch an attack from such a height.

A few seconds before the bombers arrived over the city on their deadly mission of destruction, carrying 24,000 pounds of bombs, the 95th Pursuit Squadron dove earthward, belching out volleys of machine gun fire and releasing light bombs on the enemy's anti-aircraft nests, theoretically disabling them to such an extent that they could not damage the oncoming bombers. Then the light pursuit planes zoomed back up into the sky,

CALIFORNIA'S CAPITOL HIDDEN

Spreading a smoke screen over the capitol grounds at Sacramento, Cal., during the Army Air Corps West Coast maneuvers.

ready to come down to the aid of the big bombers if necessary. Continuous radio communication was maintained in the air between the two squadrons and with their ground bases. The world was permitted to listen-in on the proceedings over a nationwide radio hookup. The giant bombers soon "laid their eggs" and wiped out the enemy base, making it possible for ground troops to enter again and reoccupy Los Angeles.

During the west coast maneuvers, a bombardment plane equipped with a "robot" pilot demonstrated what might be expected in the elimination of the human element as far as possible in future aerial tactics. The automatic pilot flew a huge twin-motored bomber from Sacramento to San
Francisco and returned without a human hand touching the controls. Less spectacular than these demonstrations during the "war games", but just as important from a military standpoint, was the transfer of 150,000 pounds of supplies, including pursuit-plane wings and heavy engines, from San Diego to Sacramento and return, a distance of 1,000 miles. It demonstrated that aircraft units can transport their own supplies over great distances without serious attention to bulk or weight.

The flight of an Air Corps transport plane from Miami to Panama, 1,200 miles, in 11 hours and 25 minutes in February, the night raids con-
partment and other federal agencies covering more than 14,000 square miles during the year. Upon the request of the Costa Rican government, the Air Corps completed the photographing of the proposed Pan American highway in October.

An interesting technical development in military aircraft design during 1930 was linked with photographic missions deep in enemy territory. The Fokker Aircraft Corporation built a twin-motored monoplane, the XO-27, especially for photographic missions under war time conditions. The plane, representing many departures from conventional design, had two 600 horsepower Curtiss Conqueror engines recessed into the wings and was equipped with retractable landing gear. The bow cockpit was equipped as a darkroom for the photographer-observer, while a pilot and gunner-radio operator made up the other members of the crew.

A new experimental observation plane was developed by the Curtiss Aeroplane and Motor Company and delivered to the Army Air Corps late in the year. Known as the XO-1G, the plane was powered with a water-
cooled Curtiss D-12 engine and showed a speed of 147 miles an hour in preliminary tests, considerably faster than standard types in use. The landing gear was streamlined to reduce wind resistance. The wheels were located further back than on other designs and the landing gear was shorter, tending to eliminate ground loops. Brakes and a 12-inch pneumatic tail wheel, which could be steered by the pilot, were additional features.

Keystone Panther bombers, powered with Wright Cyclones or Pratt and Whitney Hornets, and Curtiss Condors, powered with Curtiss Con-
program created by the act of July 2, 1926. In general, the act proposed to create a bombardment wing on each coast of the United States, an attack wing in the center of the country, and an additional pursuit group on the northern border. Provision also was to be made for defense of the insular possessions, an observation squadron and a photo section in each of the nine corps areas, and the necessary schools and other utilities. It proposed to provide the Army Air Corps with a total of 1,800 “serviceable airplanes” at the end of the five-year period.

During 1930, the Judge Advocate General of the Army rendered an opinion that the “1,800 serviceable airplanes” authorized by the Army Air Corps act did not include airplanes undergoing major overhaul or repair at Air Corps depots as they were manifestly unserviceable during the time they were at the depots. The opinion was approved by the Secretary of War. It appeared that the tactical units could never be brought up to the strength called for unless such a ruling could be held as the intent of Congress in enacting the legislation.

According to provisions of the five-year program, the Army Air Corps should have had 1,520 serviceable airplanes on hand at the close of the fiscal year 1930. It actually had 1,319 airplanes on hand and 211 on order.
The 1,319 airplanes, however, included those which were undergoing major overhaul and repair and 133 airplanes which were more than five years old. The equipment problem was primarily one of quantity, since the quality of Army aircraft showed continued improvement.

The "West Point of the Air", the Army Air Corps' great training center at Randolph Field near San Antonio, Texas, was brought a step closer to completion during 1931. When ready for occupancy in January, 1932, it will be the largest and most comprehensive aviation school in the world, covering 2,300 acres of buildings centered on 450 acres. It was planned at a cost of $11,000,000.

**READY FOR "DOG FIGHT"**

Boeing P-12 Army pursuit plane, powered with a Pratt and Whitney Wasp engine, such as was seen in combat maneuvers in the West.

Pending the opening of the new school, the older training centers at Kelly, Brooks and March fields carried on, graduating 306 advanced students during 1930. While an increasingly large number of West Point graduates sought admission to the Air Corps, the vast bulk of flying cadets came from civil life. More than 4,000 youths sought to enter the Air Corps schools during 1930; 932 qualified for admission; 591 were sent to training schools; 227 completed the course and 141 qualified for commissions in the Regular Army.

The Air Corps personnel problem continued to be one principally of
rank. Although Tables of Organization called for a major to command each squadron, only five out of 53 squadrons were commanded by majors; captains, first lieutenants, and in some cases even second lieutenants were in command of squadrons, charged with the lives and training of 18 fellow officers, 129 enlisted men, and planes, armament, and other equipment valued at more than a half million dollars. The Assistant Secretary of War for Aeronautics requested the speeding up of Air Corps promotion scheduled for officers, and the creation of adequate grades and ratings for enlisted men.

The five-year program called for 1,374 regular officers at the end of the fiscal year 1930. Officers actually commissioned at that time numbered 1,271, an increase of 79 over 1928-29. The program called for 12,086 enlisted men at the end of this period, and the Air Corps was only 54 short of this total. The program also authorized 330 reserve officers on extended active duty, but only 258 were assigned because of the limited number of planes available. The Assistant Secretary of War for Aeronautics urged the provision of additional service-type equipment for the use of reserve officers. Reserve training totaled 22,500 hours during 1930, which was considered far from adequate by Air Corps officials.

Military aviation will always contain a greater element of danger than any other form of flight, because of the extra demands made upon planes and pilots by acrobatic and other tactical requirements, but the efforts of
the heads of the Air Corps to promote efficiency of operations were closely synchronized with a steadfast purpose to insure the safety of fliers through sturdy equipment and careful training plus as many hours of flying practice as funds permitted.

During 1930, planes of the Army Air Corps flew 32,500,000 miles as compared with 27,495,790 miles in 1929. There was only one fatal accident in 1930 for every 855,900 miles flown, as contrasted with one for every 627,000 miles flown during the preceding year. The record among flying school instructors was particularly good. During the last seven years, instructors on duty flew a distance equal to one-quarter the distance from

![ON LINE FOR INSPECTION](image)


the earth to the sun. There were but five fatalities or an average of one fatality for each five million miles in the air.

The diligence of the Air Corps flying chiefs, F. Trubee Davison, Assistant Secretary of War for Aeronautics, and Maj. Gen. James E. Fechet, Chief of the Air Corps, was in no small way responsible for the increased efficiency of the air force. Flying in a speedy Consolidated Fleetster, powered with a Pratt and Whitney Hornet engine, Secretary Davison made a 10,000 mile inspection tour to all parts of the country during July. General Fechet also flew thousands of miles inspecting posts and investigating new developments which might serve to increase the efficiency of the Air Corps.
Steaming into the wind with her deck crowded with fighting planes, the U. S. S. Saratoga, Navy aircraft carrier, sends a plane from her deck.
Chapter VII

With the Navy's Flying Fleet

Aircraft Squadrons in Mimic Warfare—Five-Year Program Nears Completion—Navy's Aviation Problems at Sea—Planes Improve in Efficiency—Catapults Installed on Men-of-War

Naval aviation, long recognized as the “eyes of the fleet”, continued to gain recognition among Navy strategists as the “mailed fist” of the forces at sea as 1931 operations got under way. With the addition to the “flying fleet” of diving bombers, two-seater fighters and three-purpose planes, an evolution in the Navy’s aerial tactics has taken place. The planes with the fleet had definitely demonstrated their usefulness in reaching an objective on land and in striking a devastating blow to an opposing sea force.

Winter maneuvers with the fleet during the last three years at Honolulu, Panama and Colon and joint exercises with the Army Air Corps in 1930 on the west coast were an important factor in proving the efficacy of an air force at sea on the backs of the fleet. With fighting, scouting, torpedo and bombing planes on the landing decks of the Navy’s three aircraft carriers, observation planes on the catapults of 16 battleships, and scouting planes ready for action on 12 light cruisers, the Battle Fleet and Scouting Fleet of the United States Navy have been able to coordinate the operation of aircraft at sea in important naval maneuvers.

The blows which “won the war” during these important peacetime maneuvers were struck by airplanes operating with the fleet. At Honolulu, planes from the decks of the carriers went over the naval defenders and smothered the shore troops in spite of counter attacks by aircraft. At Panama, the power of the “flying fleet” was even more dramatically demonstrated. On an arc the radius of which centered at Panama, a great defensive fleet of battleships, destroyers and submarines was spread out from shore to shore, 150 miles from the objective to be attacked. Behind the line of defense was the Lexington with its fleet of nearly 100 planes ready and eager to take to the air to meet the fliers from the attacking carriers. The Saratoga, her flight deck crowded with planes, was at sea, 900 miles from the objective at which she proposed to hurl bombs within 24 hours. The defenders were powerless to locate her and were forced to wait on the lines for the attack they knew was coming.

Screened by her auxiliary defenders throughout the day, the Saratoga cruised toward Panama. When night fell she went to full speed, faster
than any other ship afloat, 35 knots. One cruiser picked her up, but according to theory, would have been put out of action by the four cruisers which formed the principal escort for the Saratoga. The aircraft carrier approached the cordon 150 miles from Panama before daylight, and then 85 planes left her decks. They took off in darkness and made a rendezvous in darkness, all directed by radio and under the cover of night. They flew across the heavily defended area and swooped down on Panama. The Lexington had no chance against the torpedo and bombing planes, and the planes from her decks could not get into the air quick enough to meet the elusive attacking planes. The attack came from all directions. The

first contingent destroyed the Miraflores and Pedro Miguel locks. Another division bombed ground fortifications. A third swung in from the north, and while the defenders were busy against the other air squadrons, bombed the great Gatun locks. The Saratoga's defense, caught in an unexpected current, became separated from her and laid her open to the big guns from the defending battleships. However, in real war, the Saratoga would have escaped by her superior speed and then called her planes in by radio. This was proved possible in previous and subsequent maneuvers.

During the 1930 winter maneuvers, an attack of a similar nature was staged but the attacking force failed, and the Saratoga was bombed out of the water, not by big guns, but by airplanes from the Lexington. This time the Lexington's squadrons got the jump. The Saratoga had been
"EYES" AND "FISTS" OF THE BATTLE FLEET

"Red Rippers" of the Battle Fleet squadrons, flying their Boeing fighters (Pratt and Whitney Wasps) in perfect formation during maneuvers on the West Coast.
ordered to come in behind an escort of slower cruisers and battleships. The big guns were her defense instead of her speed and, according to the rules of the war game, the big guns failed to carry out their assignment.

The joint Army and Navy maneuvers along the California coast during 1930 emphasized the value of naval aircraft in attacking land bases from the decks of the ships at sea. These war games, in which aircraft carriers and planes from the battleships and light cruisers played an important part, convinced many Navy strategists that the airplane has become the “fist”

![Planes of the Aircraft Squadrons Battle Fleet flying in close formation over San Diego](image)

SIXTY: COUNT THEM

Planes of the Aircraft Squadrons Battle Fleet flying in close formation over San Diego make possible a remarkable photograph.

as well as the “eyes” of the fleet. The flying fleet demonstrated that it can directly attack strategic shore centers over which battleships must pound away at each other, miles from the objective of their fight.

The success of naval aviation as a coordinated branch of fleet operations justified the carrying out of the five-year naval aircraft program and the authorization of five small aircraft carriers by Congress. Appropriations for one of these 13,800 ton carriers were approved and the contract for its construction awarded during 1930. It appeared that aircraft procured under the 1930–31 authorizations would raise the total number of air-
planes on hand to 1,000 by 1932 in accordance with the five-year aircraft building program approved by Congress, June 24, 1926.

When the first-year program was inaugurated, the Navy had 351 useful airplanes. In July 1, 1927, there were 468; on July 1, 1928, 624; on July 1, 1929, 829; and on July 1, 1930, 928. The last appropriating year contemplated by the act ends June 30, 1931. The Navy's Bureau of Aeronautics indicated that it will need thirty additional airplanes to outfit light cruisers Nos. 32 to 36 to be delivered from 1932 to 1934, and 114 planes to equip the new aircraft carrier, which will be completed in 1934. Requests for

HELLDIVERS FOR CARRIERS

Curtiss F8C-4 Helldiver (Wright Cyclone), a new two place fighter and diving bomber, designed for use on the aircraft carriers.

this equipment were to be included in legislation to be presented to Congress, aside from that calling for completion of the five-year program.

Examination of expenditures under the five-year program indicates that a saving of $20,307,150 over the original estimates was accomplished because annual wastage was reduced through the building of higher quality planes and more reliable engines by American manufacturers under contract, and through increased skill of pilots and maintenance personnel. The record showed that the Navy was getting more airplanes for its money and more service from its airplanes than ever before. During the 1930 fiscal year, 234 service type and seven experimental airplanes were delivered to the Navy.
Practically all the changes made in naval aircraft as the result of experiences gained in the "war games" and through daily operations, except such as were due to the normal development of the art, were in introducing features which would permit them to operate from ships. Ship-based land planes were equipped with emergency flotation gear to keep them on the surface in a forced landing at sea. They also have carrier arresting
With the Navy’s Flying Fleet

Gear and low stalling speeds to permit safe and satisfactory operation from the flight decks of the carriers. Most planes were equipped with radio to enable them to keep in touch with their moving bases and to make possible direction of a flight from the time it leaves the carrier until it reaches its objective and is directed to return. Observation planes were equipped with sturdy float type landing gear to permit landing in rough water. The use of carriers also resulted in the development of a satisfactory but light amphibian landing gear. The size of fleet airplanes was kept at a minimum to utilize the limited space aboard ship to the best advantage.

The elimination of wood from naval aircraft structures was a development continued during 1930. The last of the wooden fuselage airplanes of the Navy passed with 1930. Wooden wing ribs and wooden tail structures were being entirely replaced by metal in new designs, while almost all new experimental types and new production aircraft had metal wing beams as well. Experiments with metal monocoque fuselage construction were continued.

Corrosion-resisting steels were investigated in an effort to find materials better adapted for marine operations. Streamline tie rods made of various
steel compositions were service tested; seaplane floats of stainless steel were under observation. Wing ribs constructed of spot-welded strip stainless steel were incorporated in some wings for service tests. A discovery that incorrect heat treatment of aluminum alloys used in floats and hulls was responsible for rivet corrosion was expected to eliminate this trouble.

While experimental work was under way on liquid-cooled, radial Diesel, air cooled, in line and several other types of engines, the advantage in weight, reliability, cost, durability, ease of maintenance, and performance at altitudes of the American radial air cooled engines continued to rule in favor of that type for most naval operations. Definite progress was made in increasing the power of these engines through better cylinder and crank shaft design, and by the use of higher compression ratios and intake pressures.

The catapult, used to hurl airplanes into the air at flying speed from the decks of battleships and cruisers, is distinctly an American achievement, under development since 1912. Two catapults have been made for
each of the 12 latest battleships and all light cruisers, and one for each of the older battleships, but eight powder type catapults still await installation in battleships. The older and smaller air catapults on the ten cruisers of the Omaha type, due to their age and the increase of weight of scouting planes, were to be replaced with larger equipment. Success of the catapult is indicated in the record that no serious accidents or injuries resulting during 1930 from malfunctioning of these devices.

The advent of the two-seater fighter as a possible successor to the single-

place job so closely identified with aerial dog fighting was seen during 1930. The development of the Curtiss Helldiver, a two-place carrier fighter and diving bomber, was illustrative of this evolution. Powered with a 575 horsepower Wright Cyclone engine, the new plane attained 180 miles an hour speed and carried a light bomb which it released after a steep dive, making it almost invulnerable from attack. An improved type of the Boeing shipboard fighter, powered with a Pratt and Whitney Wasp engine, continued in general use on the carriers. It was a single-place job with an exceptionally high speed and ceiling.
The first of a contract for 36 O3U-1 observation and scouting planes was delivered to the Navy in June. Manufactured by the Chance Vought Corporation and powered with a Pratt and Whitney Wasp engine, it represented the last word in observation type planes for use on the battleships and cruisers with the fleet. The O3U-1 was an improved type Vought Corsair, the latest of the Vought series: UO-1, O2U-1, O2U-2, O2U-3, and O2U-4.

The Berliner-Joyce Aircraft Company developed an interesting experimental fighter for the Navy during 1930, the XFJ-1, of monocoque construction and equipped for carrier landings and with emergency flotation gear and brakes. It was powered with the Pratt and Whitney Wasp engine. The new PM-1, the first of which, on a contract of thirty, was delivered to the Navy in July by the Glenn L. Martin Company was illustrative of the latest type patrol plane. Other service and experimental planes developed for the Navy are described in the chapter “Manufacturing American Aircraft” and in the technical chapter “Out of the Engineering Laboratory.” Drawings of some of these new types are included in the Aircraft and Engine Design Section.

The rapid improvements in the design and construction of aircraft and in the skill of pilots and maintenance personnel can be credited with the Navy and Marine Corps’ brilliant operations record for 1930. Although tens of thousands of landings and take-offs were made at sea from the limited decks of the aircraft carriers and millions of miles were flown in wing-to-wing formations, diving, looping, and executing maneuvers necessary only in naval aviation, the Navy and Marine Corps attained the greatest record in their history during 1930.

Out of a total of 252,095 flights made during 1930, only 14 resulted in fatal injuries to occupants of the aircraft. Flights were 99.9954 per cent. safe from fatalities. During 1930, the Navy and Marine Corps flew 26,478,700 miles, an increase of 6,965,605 miles over 1929. It was a brilliant record of performance, worthy of tribute to the high type of personnel trained by the naval services and to the excellence of their equipment.

The Marine Corps aviation operations were conducted at Quantico, San Diego, Haiti, Nicaragua and Guam. As in previous years, the active service flights during 1930 in Nicaragua reconnaissance, courier, passenger and freight carrying, and attack missions were reported to have greatly facilitated the suppression of banditry by the small military forces in the field.

A Marine, Capt. Arthur Page, won the eleventh annual Curtiss Marine Trophy Race in competition with the best race pilots of the Navy and Marine Corps. He was the only representative of the Marines, winning the race in a Curtiss Fighter at an average speed of 164.1 miles an hour, establishing a new speed record for the event by two miles an hour. The
trophies were presented by Glenn H. Curtiss, in one of the last public appearances before his death.

Capt. Page later flew a Navy observation plane, equipped with standard instruments and a radio beacon receiver, from Omaha, Nebraska, to Washington without seeing the ground from his enclosed "blind" cockpit. Another officer landed the plane at refueling stops after Capt. Page had brought it directly over the field. Capt. Page entered the speed race in the National Air Races at Chicago as the Marines' representative and was leading when he crashed and was killed.

The Navy's brilliant part in the development of lighter-than-air activities is reviewed in another chapter, but suffice it to say that the financial and technical contributions of the Navy department to this field are responsible for the dirigible's present high state of development in America.

No review of the year's activities in naval aviation would be complete without some mention of the excellent direction it was afforded through David S. Ingalls, Assistant Secretary of the Navy for Aeronautics, and Rear Admiral William A. Moffett, Chief of the Bureau of Aeronautics. Both made extended trips by air during the year to inspect naval air bases and were responsible for the efficient development and operation of the "flying fleet."
HOME FROM THE CONQUEST
All hands stretching out to grasp the hand of Rear Admiral Richard E. Byrd as he forces his way through the crowd to New York's City Hall.

"COLUMBIA" DOES IT AGAIN
Veteran Bellanca (Wright Whirlwind) monoplane lands at Croydon aerodrome, London, after Boyd (right) and Connor span Atlantic in it.
CHAPTER VIII

HISTORY-MAKING FLIGHTS OF 1930

Five Successful Atlantic Crossings—Transcontinental Records Broken—Graf On Four-Continent Junket—R-100 Flies to Canada—First Bermuda Flights—Altitude, Duration Marks Raised

AVIATION’S achievements in the field of spectacular flights during 1930 overshadowed all previous years, with more than a score of brilliant performances which could be classed as “history-making.”

The Atlantic was crossed five times, one a direct non-stop hop from Paris to New York; all transcontinental speed records were broken; world altitude and refueling duration marks were raised; the Graf Zeppelin braved equatorial storms on a four-continent flight; the R-100 made a round trip from England to Canada; the first air mail plane crossed the South Atlantic; Bermuda was linked with New York; Kingsford-Smith completed his globe-girdling trip and broke Hinkler’s London-Australia record; New York was linked with Mexico City and Panama on non-stop flights, brought within 52 hours of Buenos Aires; a girl flew from London to Australia; and Byrd returned from the South Pole to receive a hero’s welcome.

The spectacular flights, many of them measures of engineering progress, served an important purpose in sustaining public interest in aviation during a year when general business was depressed. It was true, nevertheless, that the world was apt to view as commonplace, accomplishments which would have been considered all but impossible a few years before.

Transcontinental Records Fall

While 1930 witnessed the shrinking of distances between major cities throughout the country, the transcontinental record flights continued to hold the center of interest, principally because they spectacularly measured the progress of flying. Fowler, Maynard, Kelly, Macready, Maughan, Goebel, Collyer and Hawks are names which went into history between 1912 and 1929 associated with record transcontinental flights. While the name of the latter was again destined to stand out above all others in this field during 1930, it was Colonel and Mrs. Charles A. Lindbergh who opened the season’s record onslaught with a spectacular flight from Los Angeles to New York on Easter Sunday, April 20.
In the dim half light of the early morning hours, the Lindberghs roared down the runway at Grand Central Airport near Los Angeles in their swift Lockheed Sirius monoplane powered with a Pratt and Whitney Wasp engine. Only a few spectators had watched them climb into electrically heated flying suits and prepare for their high altitude flight across the continent. Flying above 10,000 feet, they were not sighted until they spiraled down to the airport at Wichita in midafternoon for a 20 minute refueling stop on their 2,700 mile trip. It was shortly after 11 o’clock that night that the beacon at Roosevelt Field, L. I., picked the Lockheed plane out of the sky as Lindbergh circled for a landing on the great white run-

HAWKS SETS NEW RECORDS

Capt. Frank Hawks, who broke all transcontinental speed records, is seen above the clouds over Los Angeles in his Travel Air Mystery Ship (Wright Whirlwind).

way from which he had taken off for Paris and world fame three years before.

The Lindberghs averaged more than 180 miles an hour to complete the trip in 14 hours, 45 minutes and 32 seconds, elapsed time, faster by 2 hours, 52 minutes and 44 seconds than the record non-stop time made by Capt. Frank M. Hawks in 1929. They depreciated efforts to credit them with breaking Capt. Hawks’ record, which was a non-stop flight with a heavy load. The Lindberghs held to levels between 10,000 and 15,500 feet to “test the theory that airplane speed and efficiency are to be sought above storm areas, in rare atmosphere.” Capt. Hawks was one of the first to congratulate the Lindberghs, insisting that they had broken his speed
record. Hawks seemed pleased that someone had bettered his time and opened the way for new record attempts across the continent.

Roscoe Turner, with a lion cub as companion, flew his Hornet-powered Lockheed Air Express from Los Angeles to Curtiss Airport a month later in an attempt to better the Lindberghs' time. Turner made the trip in 15 hours and 37 minutes, almost an hour slower. Undaunted, he eyed Capt. Hawks' east-west record and headed west May 27 to better it with the aid of stops for refueling. He landed at Grand Central Airport in 18 hours, 43 minutes and 34 seconds, elapsed time, after a refueling stop in Wichita,

bettering the non-stop time of 19 hours 10 minutes and 32 seconds made by Hawks. Again Hawks grinned congratulations; insisted his record had been broken.

Edward F. Schlee and William S. Brock, who won world fame in 1927 when they flew from Detroit to Tokio in a few days, emerged from their aircraft salesroom in Detroit to set a new round trip ocean-to-ocean record. Stepping into their Lockheed Air Express (Pratt and Whitney Wasp) at Jacksonville Beach, Fla., June 17, Brock and Schlee reached San Diego, Calif., without incident in 13 hours, 55 minutes and 30 seconds to better the time made in 1920 by Maj. Theodore McAuley,—19 hours, 10 min-

CROSSES CONTINENT IN GLIDER
Capt. Frank Hawks, transcontinental speed flier, "loafed" across the continent in his Franklin glider "Eaglet" towed by an airplane.
utes. Returning through electrical storms over the Rockies, they were forced to refuel at Tallulah, La., but pushed on to Jacksonville Beach in 16 hours and 50 minutes to better the 1922 record of Lieut. James H. Doolittle—22 hours, 20 minutes. Despite adversity, they had completed the ocean-to-ocean round trip in 31 hours and 58 minutes, elapsed time for a new record. The route was 800 miles shorter than that flown by Capt. Hawks in 36 hours, 48 minutes elapsed time from New York to Los Angeles and return.

The speedy flights of the Lindberghs, Turner, Brock and Schlee whetted

the appetite of Capt. Frank Monroe Hawks for new transcontinental laurels. He had turned to gliding after setting up his 1929 cross-continent records, and during the first week in April had “loafed” across the continent from San Diego to New York in a Franklin glider, the Texaco Eaglet, towed by a Waco biplane. At the end of a 500 foot cable, he made the 2,960 mile trip in 36 hours and 47 minutes flying time, making 19 stops and devoting nearly ten hours to gliding and soaring exhibitions enroute. But now speed flying again attracted his attention, and he arranged for a Travel Air Mystery ship powered with a 300 horsepower high
compression Wright Whirlwind engine. It was christened “Texaco 13”, given license number 1313, and soon groomed for its first transcontinental test.

Capt. Hawks went to Curtiss Airport, Valley Stream, L. I., early on the morning of August 6, talked with mechanics about an engagement to play golf with his father in Los Angeles at 4 o’clock that afternoon. He left the runway at 6 A.M. (Eastern Daylight Saving Time) headed for Columbus, St. Louis, Wichita, Albuquerque and Kingman, his refueling stops on the westward flight. He grinned as his father stepped forward to congratulate him at the Los Angeles Municipal Airport at 4:50 P.M. (Pacific Standard Time). His elapsed time was 14 hours, 50 minutes, 43 seconds. It was the first such flight made in full daylight and faster than Turner’s record by three hours and 52 minutes. Despite head winds, he had averaged 179 miles an hour, often making 240. Hawks’ name was again written after the official east-west speed record.

It was moonlight when the red and white Mystery ship sped down the runway at Grand Central Airport on the morning of August 13 and hurdled the San Bernardino mountains on its way east. Albuquerque in three hours and 26 minutes; then Wichita, Indianapolis, and finally Curtiss Airport at Valley Stream, L. I., for a new transcontinental record of 12...
hours, 25 minutes and 3 seconds. Hawks smiled as he stepped from his cockpit, his white shirt and linen knickers unsoiled. Friends’ efforts to compare his new record with the Lindberghs’ slower time brought a sharp retort from Hawks, who disclaimed interest in records, spoke of the venture as a “demonstration of the possibilities of an aerial pony express, with relay pilots and fast planes at intermediate stops.”

While the transcontinental record flights held the center of the aviation stage, shorter speed flights linking major cities forcefully illustrated the possibilities for rapid transit with faster transport planes. Early in the year, Lee Shoenhair flew from New York to Tampa in a Lockheed Vega cabin monoplane in seven hours and 15 minutes. In March, Capt. R. A. Ellis of the Standard Oil Company’s aviation division brought his Lockheed Vega (Pratt and Whitney Wasp) from Miami to Newark in eight hours to average 160 miles an hour. In June, Dale “Red” Jackson, the endurance flier, flew a Travel Air Mystery ship from Montreal to New York in 115 minutes to average 190 miles an hour. In July, Jackson sped from Detroit to Cleveland in 26½ minutes.
Hawks, after his brilliant transcontinental flights in August, turned to clipping hours from usual transportation times between important cities. He shot his low-winged Mystery ship from Detroit to New York, September 27, in two hours and 41 minutes, averaging a little more than four miles a minute. He brought Boston and New York within 54 minutes of each other on October 7. Then two days later shot from Philadelphia to New York in 20 minutes, keeping a 270 mile an hour pace.

Turning again to longer distances, Capt. Hawks left Valley Stream, L. I., at 8:50 o’clock on November 6 and headed his low-winged monoplane southward for Havana. Stopping 23 minutes at Jacksonville for fuel, spending 20 minutes clearing customs at Miami, he arrived in the Cuban capital in semi-darkness. He had bettered the 14 hour time of Wilmer Stultz, who carried Charles A. Levine and Mabel Boll on a non-stop trip in 1928, by setting a new record of nine hours and 21 minutes. Flashlights boomed, Hawks grinned and addressed the Cuban reporters in Spanish.

The return trip was made in even faster time when Hawks set his veteran speed ship down on Roosevelt Field, three days later, after a flight from Havana in eight hours and 44 minutes. He cut 38 minutes from his own record between the two metropolises, although he fought head-
winds over nearly 800 miles of the distance, and stopped in Miami and Charlotte, N. C., enroute. Always insistent that no chances should be taken by pilots, Hawks disclosed upon arriving in New York that he had worn a rubber life-preserver jacket beneath his parachute, the gift of Ambassador Harry F. Guggenheim.

Latin American Flights

Three other long distance flights had Latin American cities as their goals. Lieut. Will White and Lieut. Clement McMullen fixed their eyes on distant Buenos Aires. Fierro and Cortes, Mexican army aviators, pre-

pared for a speedy trip between New York and Mexico City. Capt. Roy W. Ammel, Chicago broker, impatiently waiting for favorable weather over the Atlantic, headed his plane for Panama in a non-stop flight.

Taking off from Newark Airport February 14 in a Lockheed Vega (Pratt and Whitney Wasp) monoplane, Lieuts. White and McMullen began a flight to the Argentine capital which broke existing records for each lap as well as for the entire trip. Their flying time from Newark to Miami was eight hours and 30 minutes; they crossed the Caribbean non-stop to Panama in 11 hours and 20 minutes; Panama to Talara was
achieved in nine hours and five minutes; Lima was but four hours and 40 minutes further away; the lap to Arica was made in five hours; Santiago was then reached in seven hours and 40 minutes. They had crossed the equator, flown through all kinds of weather, and finally soared over the Andes at 20,000 feet to set a new record of six hours between Santiago and Buenos Aires.

The 6,780 mile flight was made in five days and five hours, elapsed time, of which only 52 hours and 15 minutes were spent in the air. They averaged 131 miles an hour. The flight, sponsored by the Foreign Advertising and Service Bureau and dedicated to the Latin American press, was

hailed with enthusiasm throughout South America. White and McMullen were dubbed “the eagles of the north,” ambassadors of good-will.

Mexican aviation, suffering from the tragic death of Emilio Carranza on his New York-Mexico City flight and from the death of “Sidar the Madman” on his flight to Buenos Aires, found a bright streak on the horizon June 21 when Colonel Roberto Fierro and his mechanic, Arnulfo Cortes, landed in Mexico City. They had flown non-stop from New York in 16 hours and 33 minutes, a record, in their Lockheed Sirius (Pratt and Whitney Wasp) monoplane. The flight paralleled Lindbergh’s non-stop flight to the Mexican capital from Washington in 1927. Using the slower “Spirit of St. Louis”, it took Lindbergh 27 hours and 10 minutes.
Capt. Roy W. Ammel, a Chicago broker, flew from Los Angeles to New York in September in his Lockheed Sirius “Explorer” (Pratt and Whitney Wasp) and announced after a few test trials that he was ready for a flight to Europe. November came and he had not yet received a favorable map from the weather bureau. Impatient, he decided to fly non-stop to Panama. With 703 gallons of gasoline, he roared down the runway at Floyd Bennett field November 9 for the 3,000 mile flight, charting 1,200 miles of his course over water. He landed at France Field, Panama, in 24 hours and 35 minutes, a record. Asked the object of his flight, he replied: “It has no object. I just wanted to come to Panama. I used to live here, you know.” He was planning another long-distance flight in the “Explorer” for 1931.

First Flights to Bermuda

Bermuda, the world’s most northerly coral islands and a Mecca for American tourists, was linked with New York by air for the first time during 1930. Two flights chose this strand of semi-tropical islands—mere dots to find in mid-Atlantic—as their objective.

Capt. Lewis A. Yancey, able navigator and, with Roger Q. Williams, hero of a trans-Atlantic flight to Rome, said he would fly to Bermuda
any time he was provided with a good ship, a good pilot and 48 hours notice. On April 1, the Stinson (Wright Whirlwind) monoplane "Pilot," with William H. Alexander as pilot and Zeh Bouck as radio operator, was ready for the flight. Capt. Yancey was certain he could navigate the plane direct to the 20 square mile dot, 580 miles off shore. Once in the air, the "Pilot" maintained radio communication with the New York Times. Night found them 60 miles short of Bermuda over a glassy sea. They descended, floated the swells until dawn, rose again and reached Hamilton Harbor with a wrenched pontoon strut. The flight proved the importance of seaplanes for safety in transoceanic flying and pointed out the possibilities for rapid service between New York and Bermuda by air.

Roger Q. Williams, formerly coadventurer with Yancey, was at the controls of the veteran trans-Atlantic monoplane "Columbia", used by Chamberlin and Levine in 1927, when it headed for Bermuda June 29 on a non-stop round trip. A land monoplane, certain of disaster if forced to alight at any time during the round trip flight, the "Columbia" carried Harry P. Connor, navigator, and Capt. Errol Boyd, pilot. They reached Bermuda, circled the islands and returned to New York in 17 hours and eight minutes, the first time such a flight had been tried and achieved.
The trip served as preperation for Boyd and Connor's trans-Atlantic flight later in the year.

**First Atlantic Air Mail**

The "open season" for trans-Atlantic flying was inaugurated unusually early in 1930 and lasted almost until the close of the year. Paris and Buenos Aires were linked with four day air mail service as the result of the first Atlantic flight of the year from St. Louis, Senegal, Africa, to Natal, Brazil, and then to Buenos Aires.

Anxious to complete the missing link in their air service between Paris and Buenos Aires, officials of Aéropostale, French air line interests in South America, chose Jean Mermoz to fly the first mail across the South Atlantic in an experiment to determine the possibilities of regular service. The South Atlantic had been crossed eight times before, all from east to west. Mermoz and his two companions, Jean d'Abry, navigator, and Leopold Gamie, radio operator, were to make a round trip with air mail, which formerly lost nine days by steamer across the South Atlantic.

Their Latécoère (Hispano-Suiza) seaplane winged its way westward from Senegal May 12 across the 1,700 mile water-stretch to Natal, Brazil. The plane carried mail which had left Paris by air 36 hours before. Keeping up a running story of the progress of their flight by radio to the mainland, the French fliers landed in a heavy sea at Natal in 20 hours and 16 minutes. The mail was rushed to Buenos Aires and other South American points by air. The fliers were feted lavishly, hailed as the first Atlantic air-postmen.

The French cruisers, which guarded the course of the experimental route, were lined up in readiness for the return trip July 8. Mermoz was anxious to be the first to complete the west-to-east crossing, in many ways comparable to the North Atlantic's hazardous east-west flight. The French fliers took off late in the afternoon, headed directly out to sea and started their radioed story of a pioneering flight. All was well until the sixteenth hour, when they reported a defective oil feed that was certain to force them down. They located the Phoceee by wireless and a few minutes later landed beside the relief patrol boat, 350 miles off Dakar on the African coast and only a few hours from their goal. The three fliers were taken aboard, 600 pounds of mail saved, and the plane sank. Mermoz was disappointed. He said the flight would be commonplace in a few years.

**Kingsford-Smith Completes World Flight**

When the "Southern Cross" landed at Croydon, near London, in July, 1929, it had a record rivalled by few planes ever built. It had crossed the Pacific from California to Australia; * made extensive transcontinental

*See "The Aircraft Year Book for 1929."
journeys in Australia; and then spanned Asia and Europe on a 12,000 mile flight in 12 days.† The Atlantic, conquered but once on an east-west flight, was the last barrier to be hurdled in the completion of a world flight.

Hazardous as the east-west crossing might be, the world placed implicit confidence in the ability of Major Charles Kingsford-Smith to span the Atlantic and the American continent to reach his starting point in Oakland, Cal. The “Southern Cross”, a Fokker monoplane with three Wright Whirlwind engines, was ready in June, 1930.

With Evert Van Dyck, Dutch co-pilot, Capt. J. Patrick Saul, Irish navi-

† See “The Aircraft Year Book for 1930.”
course, flying "blind," and had advanced only 120 miles in four hours. Their compasses pointed crazily east and west. They were flying through the Grand Banks fog that swallowed Nungesser and Coli, the Princess Lowenstein-Wertheim, and kept the Bremen pilots short of their goal. Kingsford-Smith realized that he could not make New York non-stop. A rift in the fog. The airport at Harbor Grace appeared. The Australian flier headed the big ship into the field, landed. He asked for a cigarette, said it was a "tough 31 hour flight", and prepared for the 1,200 mile flight to New York.

The next day, June 26, the veteran "Southern Cross" made a triumphant entry into the United States, thrilled New England seaboard towns, and circled Manhattan before landing at Roosevelt Field for an enthusiastic reception. Later in the week the old ship spanned the continent, stopping in Chicago and Salt Lake City on its way to Oakland to end the world trip. Kingsford-Smith was raised to the rank of Wing Commander, showered with gifts and titles. The "Southern Cross" was presented to Capt. G. Allan Hancock, wealthy Santa Maria, Cal., banker and oil operator, who loaned the ship to Kingsford-Smith for the Australia flight, then gave it to him when the flight was successful.

**Von Gronau's North Atlantic Flight**

New York harbor received its first trans-Atlantic air liner August 26 when Capt. Wolfgang von Gronau and his crew of three students flew out of the northeast over Manhattan's crowded Battery, circled the Statue of Liberty, and followed a police escort plane to a landing in the midst of the harbor traffic. Their spectacular finish was in direct contrast to their unostentatious departure from List on the Isle of Sylt in Northern Germany, August 18.

The Captain and his three students, Eduard Zimmer, co-pilot; Franz Hack, mechanic; and Fritz Albrecht, radio operator, left Northern Germany in a five year old Dornier Wal (B. M. W.) flying boat on a training flight to the Faroe Islands and Iceland. It was the same ship that the late Roald Amundsen had used in the Arctic and Capt. Frank Courtney had been forced to bring down in mid-Atlantic, where it demonstrated its seaworthiness.

Capt. von Gronau held as his life-long ambition a flight to New York with a landing in the harbor. He planned the flight by the northerly route, but failed to tell his student companions or notify his government. In Iceland, he told the students of his plans, wired the government for permission, took off for Greenland an hour later. The long hop to Greenland completed, they flew on to Labrador, then Nova Scotia, and made a speedy trip down the coast into New York harbor. They had flown 4,670 miles in 47 flying hours, nine days elapsed time.
The Germans flew their flying boat overland to Buffalo, then to Chicago for the National Air Races. Everywhere they were met by enthusiastic throngs who hailed them as true adventurers. Germany received them later as "builders of German prestige".

**New York-Paris: Two-way Airway**

Capt. Dieudonné Coste, premier airman of France, and Maurice Bellonte provided the world with a brilliant counterpart to Col. Charles A. Lindbergh's spectacular flight to Paris when they made the first non-stop Paris to New York flight the first two days in September. But while the two flights were virtually over the same route, they furnished a study in sharp contrasts.

Lindbergh, an obscure air mail pilot, flew alone without radio in a Ryan monoplane, powered with a 200 horsepower Wright engine, which had flown only across the continent. He had two compasses on a conventional instrument board and maps to guide him on the 3,610 mile eastward flight, which he made in 33 hours and 29 minutes to average 107 miles an hour.

Coste, France's idol of the air, a veteran war flier with six world air records and a score of brilliant flights to his credit, left Le Bourget with a companion in the radio-equipped Breguet "Question Mark," powered...
with a 650 horsepower Hispano Suiza engine, which was the veteran of many record flights. Its instrument board had more than 30 dials with practically every instrument known to science. Yet with all this preparation, and the advantage of tail winds for half of the 4,100 mile journey, the French fliers found that their average speed was cut down from 160 to 109 miles an hour. Their flying time was 37 hours and 18 minutes. The westward journey proved far more difficult than that which Lindbergh had experienced.

After reaching Nova Scotia, they attempted to fly beneath low hanging rain clouds to keep the ground in sight. They flew on, skirting a precipice. Suddenly there loomed up out of the mist another precipice on the port side. They were caught beneath the banks of a river. It was a tight place. Bellonte was at the controls. The ship was light after the long flight across the sea. He gave her the gas and shot upward, cleared the barrier. Several hours later they landed at the Curtiss-Wright Airport on Long Island. A crowd of 10,000 swept the field. Among the first to congratulate them was Col. Charles A. Lindbergh. The Aeronautical Chamber of Commerce entertained them at an informal dinner.

To keep a promise and win a $25,000 prize offered by Col. William E. Easterwood, Jr., Coste and Bellonte flew from New York to Dallas non-stop. They said the 1,700 mile flight was "easy". A mob of 20,000, characterized by Coste as "even more enthusiastic than New York", swept police lines aside in their reception of the fliers. The two Frenchmen flew back to New York the next day, made a side trip to the capital, and started a tour of the country, in the interest of aviation and Franco-American friendship, almost as extensive as that made by Lindbergh. They returned to France in October, set up their plane on the coast, flew to Le Bourget to receive a great ovation from the French people. All admitted, however, that it lacked the spectacle and buoyant enthusiasm of the Lindbergh reception. France had learned to expect great things from her idol—Coste—and in this, his greatest effort, he had not disappointed them.

"Columbia" Spans Atlantic Again

Capt. J. Errol Boyd and Lieut. Harry P. Connor, companions with Roger Q. Williams on the non-stop round trip from New York to Bermuda earlier in the year, prepared the veteran Bellanca (Wright Whirlwind) monoplane "Columbia" for its second crossing of the Atlantic. The "Columbia" had been flown non-stop from New York to Germany by Col. Clarence Chamberlin, with Charles A. Levine as passenger, in 1927.

In mid-September, the "Columbia" left Montreal for Harbor Grace, Newfoundland, but was forced to land at Charlottetown, P. E. I., due to bad weather. The flight to Harbor Grace was continued ten days later
and the ship prepared for the Atlantic hop. Boyd, a Canadian, and Connor, former U. S. Navy flier, took the entire runway at Harbor Grace to get off with their heavy gas load on the morning of October 9. Headed east through squally weather, they were sighted by the steamers Quaker City, Lancastria, and Virginia. It was nearly dusk on October 10, with Croydon only a short distance away, when the gasoline feed line clogged. Capt. Boyd landed the plane on the narrow beach of the tiny Scilly islet of Tresco, continued the next day to Croydon, their destination. Their total time in the air was 27 hours and three minutes.

STARTING SIX MILE CLIMB

Lieut. Apollo Soucek, premier altitude flier of the U. S. Navy, over capitol as he starts climb for new world altitude record.

A short stock man, remembered at Croydon for his sensational solo flight—the first in his life—from Paris to London in the “Columbia”, was among the first to greet the new pilots of the veteran ship. He was Charles A. Levine. Boyd confided to him that the flight was “tough as hell.” It was the fifth heavier-than-air Atlantic crossing of the year, the twenty-sixth in history.

Graf’s Four-Continent Flight

The Graf Zeppelin, veteran of a globe-circling flight in 1929 and five Atlantic crossings, continued its brilliant record of achievements to rival in many ways the progress made in the heavier-than-air field. The Graf’s
outstanding flight during 1930 was one to test its ability in all climates, to cross the ocean at the equator, and to demonstrate the airship's potentials to Latin Americans. The test proved severe, and the Graf demonstrated its mettle.

The great silver-nosed airship with Dr. Hugo Eckener at her helm left Friedrichshafen Sunday afternoon, May 18. Hailstones "as big as walnuts" tore a dozen holes in her outer covering near Lyons on the first lap of her flight to Seville. With 20 passengers and a crew of 42, the Graf headed for South America. Torrential downpours near the equator bore down like tons of added ballast, but the Graf plowed steadily along her route to Pernambuco, where she landed 62 hours after leaving Seville. Rio de Janeiro was the next stop. Then Pernambuco and the long flight up the American coast to Lakehurst. Dr. Eckener decided to cut out Havana and the Caribbean despite passengers' protests, to save time and avoid risks. Lakehurst was reached, after battling rain squalls most of the way, Saturday, May 31st.

Dr. Eckener with his flair for showmanship gave Broadway a midnight demonstration such as it had never seen when he flew over Manhattan two days later, headed for Seville on his seventh crossing of the Atlantic with the Graf Zeppelin. With her silver hull against the bright gold of the setting sun, the Graf droned over a hilltop into Friedrichshafen on June 6, ending the 19 day four-continent flight, which had taken her 21,250 miles in 280 flying hours. Her average speed was 75 miles an hour; her highest, 125; her lowest, 30. She spanned the South Atlantic in 60 hours, crossed the North Atlantic in 55 hours. The crowd roared "Hoch!" and sang "Deutschland über Alles" as the grand old man of the air, Dr. Eckener, stepped from the control cabin at the end of the flight.

R-100: London to Montreal and Return

The British dirigible R-100, completed in 1929, received her first extensive test in 1930 on a round trip flight from London to Montreal, with a 1,000 miles side trip to Ottawa, Toronto, Hamilton and Niagara Falls. Larger than the Graf Zeppelin, the R-100 was one of two giant dirigibles built under the British Air Ministry's program for linking the ends of His Majesty's far flung empire.

Buffeted by storm that ripped her tail, the R-100 became the fourth airship to span the Atlantic, completing the crossing in 78 hours and 49 minutes. She carried 37 officers and crew and seven passengers, including her designer, Commander Charles Dennistoun Burney. Canada enthusiastically welcomed her first airship visitor as she was made fast to the special $750,000 mooring mast at St. Hubert Airport, Montreal. Thousands climbed through her spacious cabins, resembling those of an ocean liner, during her two weeks stay.
Officers of the R-100 hoped to beat the best time of the Graf Zeppelin for the Atlantic crossing on the journey home, but wind and rain forced the ship to remain in the air 57 hours and five minutes on the trip to Cardington, a distance of 3,200 miles. The Graf flew from Lakehurst to Friedrichshafen, 4,200 miles, in August, 1929, in 55 hours and 24 minutes. A small, but enthusiastic, crowd greeted the returning sky queen. Cricket crowded news of the R-100's return into insignificant corners of British newspapers.

The R-101, lengthened by adding a midsection to give her greater buoyancy, was ready for a speedy trip to India and return in October. Carrying Lord Thomson, British Air Minister, and other notables, the world's largest airship, headed east October 5. She crashed and exploded at Beauvais, France, killing her 48 passengers.

**Twenty-Seven Days Aloft**

The craze for refueling endurance flights which swept the country in 1929 simmered down to two notable successes during 1930; the breaking of the Jackson-O'Brine record by the Hunter brothers, and the regaining of the record by the former holders.
Four brothers from Sparta, Ill., figured in the breaking of the world record for refueling endurance flight set at 420 hours and 21 minutes by Dale “Red” Jackson and Forrest O’Brine in the St. Louis (Curtiss Challenger) Robin. Flying a second-hand Stinson Detroiter (Wright Whirlwind) monoplane, christened the “City of Chicago”, John and Kenneth Hunter remained aloft over Sky Harbor, Chicago, for 553 hours and 41 minutes, June 11 to July 4. Two other brothers, Walter and Albert, manned the refueling ship, and Irene, a sister, prepared their meals. They flew approximately 40,000 miles on their grueling test.

“Red and Obie”, the former record holders, prepared to get the record back. They took off July 21 in the “Greater St. Louis”, a Curtiss (Challenger) Robin similar to the one used in 1929. They continued their long grind over Lambert Field at St. Louis until August 17, when they landed before a crowd of 800 with a new world’s record for endurance flying with the aid of refueling: 647 hours, 28 minutes and 30 seconds. The fliers said a “cracked crank case” forced them down. Their manager said it was lack of income from their flight.

Soucek: Eight Miles High

Lieut. Apollo Soucek, America’s premier altitude flier, set the world’s altitude record for seaplanes at 38,560 feet, then boosted the world’s land plane record to 39,140 feet in 1929. Seventeen days later, Willi Neuenhofen of Germany reached 41,795 feet in a land plane. Soucek set out to take the altitude record from Germany again, but knew that he would have to brave the rarefied air which snuffed out the life of Capt. H. C. Gray at 42,470 feet in an Army Air Corps balloon.

Taking off from the Naval Air Station at Anacostia, D. C., across the river from the capital, June 4, the Navy flier climbed his Wright Apache (Pratt and Whitney Wasp) land plane to 43,166 feet, a new world record, surpassing that of Neuenhofen and the balloon altitude record of Capt. Gray. Soucek now holds both land and seaplane altitude records.

“Amy” Flies to Australia

Amy Johnson, a British girl who hated the humdrum of life in a London office and took up flying, was scarcely noticed by British newspapermen when she took off alone in her tiny De Havilland (Gipsy) Moth biplane from Croydon “for Australia”. Few took the matter of her destination seriously, and little appeared in the press about her flight until, with amazing swiftness, she had overcome the barriers which had tripped veterans and was well on her way across Asia toward her destination.

She landed at Port Darwin, Australia, May 24, the “Empire’s heroine”, completing an 11,500 mile flight in a little second-hand patched up air-
plane within three days of Harold J. L. "Bert" Hinkler's record, which had stood for years. She crossed perilous terrain and the shark-infested waters of the Timor Sea. The British press printed open apologies to Miss Johnson for overlooking her, and she received the highest honors which a grateful empire might bestow upon its heroine.

Flies Home to Marry

The world had learned to expect great feats from the Australian flier, Wing Commander Charles S. Kingsford-Smith, and it seemed the appropriate thing when he announced in London that he would fly home to Australia, after girdling the globe, to be with his fiancée and to have a "last fling" at distance flying. The flight was filled with human interest. He was racing with three other fliers in the attempt to break Hinkler's three year old record.

"Southern Cross, Jr.," an Avro Avian, was the tiny plane used by the Australian on his swift flight from Heston, England, over the Alps, across the Mediterranean, over Southern Asia, across the Timor Sea to Port Darwin, on the northwestern tip of Australia. He crossed jungle, plain and mountains on the 12,000 mile trip in nine days and 23 hours, elapsed time. He bettered by five and one-half days Hinkler's record of fifteen and one-half days, then shot across the Australian continent to Sydney to see his fiancée, Mary Powell; promised her it was his last spectacular flight.

Byrd Returns from South Pole

Rear Admiral Richard E. Byrd, dressed in the uniform of his new rank, arrived in New York harbor, June 14, aboard his good ship "City of New York", veteran of the long, hard voyage "down under" to little America. More than a month late, he received the reception of a conquering hero, and graciously stepped aside to permit his comrades to share the spotlight. The city and nation honored him, and the Aeronautical Chamber of Commerce fêted him at a banquet June 25, in Hotel Astor, attended by all the celebrities in the aeronautical field. Frederick B. Rentschler, president of the Chamber, presented Admiral Byrd with a gold medal, struck in his honor and designed by Julio Kilenyi. Members of the expedition received silver medals. Admiral Byrd related the critical episode of the South Pole flight, which Kilenyi portrayed on one side of the medal.

"The mountain peaks and formations in our view were awe-inspiring in their majesty, terrible in the colossal shapes that had been carved into extraordinarily jagged and rounded forms. We felt insignificant and small among these lofty and eternal peaks which, since the childhood of mankind, have symbolized its aspiration. The critical time had come, the
moment we had discussed a thousand times. The air began to get rougher. We were getting close to the highest altitude the plane could reach. Our weight was a bit over 13,000 pounds. We saw the great polar plateau through the clouds. It was a critical moment.

"Bernt yelled in my ear above the roar of the engines: 'We must drop 200 pounds immediately or go back.' 'A bag of food overboard,' I yelled to Harold. Over went one of the brown bags. We had gradually gained altitude but not enough. A few hundred feet now might make the difference between success and dismal failure. Suddenly the wheel turned loose in Bernt's hands. 'Quick, dump more,' he shouted. Mac shoved it through the trapdoor. The minutes went slowly. We had a few hundred feet to spare. Bernt gave a shout of joy. The plateau stretched ahead, cloudless and glistening in the sun, giving an unobstructed route to the Pole."
CHAPTER IX
MANUFACTURING AMERICAN AIRCRAFT

New Designs Concentrated in Light Transport and Private Plane Fields
—Drastic Production Economies Effected—Price Reductions
General—Simplify Engineering Standards

THE remarkable operations record piled up by American aircraft in all parts of the world during 1930 stood as a tribute to the genius of American designers and engineers engaged in the development and construction of commercial and military airplanes. While production during the year was less than half of the peak reached in 1929, there was no slowing up of activity in the development of better designs more adaptable to the particular needs of modern business or the private flier. The Department of Commerce issued 95 Approved Type Certificates on new models introduced during the year and approved changes on units already in production to improve their performance.

With the advent of the general business depression late in 1929, most manufacturers had curtailed their production to prevent an over-supply of aircraft on the market. These reduced schedules continued in force in many factories during most of 1930, making it possible to move stocks on hand and to keep pace with the normal market. As was pointed out in an earlier chapter, sales kept pace with production throughout 1930 and in many months surpassed the production volume to indicate a movement of old stocks. The result was a reduction of completed inventories to a point which demanded an increase in production early in 1931 to meet a normal market.

The Department of Commerce listed 215 companies manufacturing aircraft in the United States toward the middle of 1930. However, 79 of these companies held the total number of Approved Type Certificates—379—issued by the Department of Commerce since it undertook the inspection of aircraft in 1927. The remainder of the companies were engaged in development of experimental models or in small scale production. It was obvious that some of them lacked the necessary engineering background and sound business management which would make them successful. The 1931 issue of the Department of Commerce directory was almost certain to see a great reduction in the total number of companies identified with the manufacture of aircraft. It might be interesting to point out that the more substantial companies represented in the membership of the Aeronautical Chamber of Commerce produced 96.2 per cent.
of the saleable aircraft manufactured during 1930. The Chamber’s manufacturing section also added 11 new members during the year to strengthen its position.

Production Economics Effected

Many of the larger manufacturing companies moved into new plants completed early in 1930 or built additions to old factories to meet their needs. A high degree of organization and efficiency was attained in most plants which employed production methods similar to those which were commonly identified with the automobile industry. New machinery and equipment was added to cut down the number of skilled workmen required for each operation with a resultant saving in operation costs. There was a marked tendency among the several large financial groups, which grew out of the mergers of 1928 and 1929, to combine certain of their manufacturing units cutting overhead costs and concentrating their skilled designers and workmen at central plants.

The Curtiss-Wright Corporation changed the name of the Curtiss-Robertson Airplane Manufacturing Company at St. Louis and the Travel
Air Manufacturing Company, Inc., at Wichita to the Curtiss-Wright Airplane Company. The St. Louis unit continued production of the Robin series and added manufacture of the Moth, previously made by a separate subsidiary, the Moth Aircraft Corporation, at Lowell, Mass. The Wichita unit continued production of the Travel Air line. The New York plant of the Loening Aeronautical Engineering Corporation, previously operated as a division of Keystone Aircraft Corporation, also a unit in the Curtiss-Wright Corporation, was closed and the well-equipped Keystone plant at Bristol, Pa., took over the manufacture of the Loening line along with


The Detroit Aircraft Corporation, another holding company with extensive manufacturing interests, made similar changes in its organization to effect economies in production. The activities of Ryan Aircraft Corporation, previously located at Anglum, Mo., and those of Parks Aircraft, Inc., formerly at East St. Louis, Ill., were moved to a central plant in Detroit. Although metal fuselages and other parts for the Lockheed planes

FORD AS HUGE SEAPLANE

Equipped with metal floats, the Ford metal monoplane (3 Pratt and Whitney Wasps) showed good performance as a seaplane.
were manufactured in Detroit, the major part of this unit's activities remained in Burbank, Cal., the original home of the Lockheed Aircraft Corporation.

General Motors' control of Fokker Aircraft Corporation, obtained through an interest purchased in 1929, resulted in the setting up of the General Aviation Corporation in 1930 with Fokker and the American Dornier interests as units in the manufacturing field.

United Aircraft and Transport Corporation continued operation of its several aircraft manufacturing units in new modern plants, including the

Stearman Aircraft Company at Wichita; the Boeing Airplane Company at Seattle; Sikorsky Aviation Corporation at Bridgeport; and Chance Vought Corporation at Hartford. The Northrop Aircraft Corporation was acquired during the year as a division of United, and operations were started in a new plant on United Airport at Burbank, Cal. The United group coordinated its engineering activities through frequent meetings of a technical committee composed of designers and engineers from each manufacturing division. They pooled their experience and laid out a common program for new projects.

The elimination of duplication of effort and greater efficiency achieved through employment of better manufacturing methods resulted in a saving
which increased the possibilities for a fair profit, and in many instances the savings were passed on to the public in the form of price reductions. An examination of a table cataloguing aircraft prices in 1929 and 1930 would show quickly that reductions of from five to twenty-three per cent. were made in each class of planes produced, and that some manufacturers offered price cuts as high as 35 and 40 per cent. from the 1929 levels. There were more than a score of models available to the private owner between $2,000 and $3,000, while companies catering to this low-price field hurried work on experimental models designed to give the public a

![NEW ROGERS FLYING BOAT](image)

Harry Rogers taking off in a new flying boat of his own design powered with a Wright Whirlwind engine, mounted as a pusher.

two place open cockpit ship with a high speed of about 70 miles an hour for $900 to $1,500. This was a development to be introduced to the general public in the spring of 1931.

There was a general trend toward simplification of the engineering standards required in the manufacture of aircraft without decreasing the margin of safety insured the buying public. The first joint meeting of the Airplane Manufacturers' Section of the Aeronautical Chamber of Commerce with the Department of Commerce, under a code of procedure drafted by the Chamber and the Department, centered around this point when the conference was called in Washington, September 26. Officials of the Department of Commerce drew up a list of proposed changes in
the Airworthiness Requirements, the government engineering code under which all American aircraft must be manufactured for sale. The manufacturers drafted a similar proposal for changes affecting 46 requirements of the Department. Many of the proposed changes of both the Department of Commerce and the manufacturers represented through the Chamber were concerned with a simplification of the requirements to prevent the limiting of the designers' field through detailed specifications. Drafted by leading engineers and designers from all parts of the country, the manufacturers' proposals on engineering matters were approved by the Department of Commerce officials in every instance, save one.

NEW AMPHIBIAN FOR PRIVATE FLIER
Privateer, a new two place open cockpit amphibian powered with a Warner Scarab engine, takes off in a yacht harbor on Long Island Sound.

The Department of Commerce was requested to waive the necessity of prospective aircraft purchasers obtaining a student pilot's permit before being allowed to handle the controls on a demonstration flight. The request was made by manufacturers during the St. Louis meeting of the Airplane Manufacturers' Section in February, and was granted by the Department. The waiving of this regulation eliminated a barrier to the sale of planes to private owners considered very important by the manufacturers. To further stimulate sales, the Chamber undertook the development of a sales manual in cooperation with sales managers of member companies to place before airplane salesmen the methods found most suc-
cessful in creating a desire for ownership. The Section also conducted an investigation of problems in the used plane market and considered the development of a manual for the guidance of dealers in valuing old planes. To supplement the Standard Manufacturers Sales Agreement prepared by the Chamber, a Standard Retail Sales Contract was being developed for use of distributors and dealers. The Chamber also inaugurated an effort to reduce aircraft freight rates through obtaining a reclassification of existing rates, in force since the World War, on airplanes, engines, accessories and component parts. A survey was made during 1930 to serve as a basis for furthering this project.

**Condemn Acrobatic Demonstrations**

Believing that “casualties during air races and individual stunts do incalculable harm to the industry,” the Airplane Manufacturers’ Section of the Chamber went on record at its Washington meeting “condemning any and all demonstrations which in order to attain spectacular publicity, emphasize the dangerous possibilities of flying.” It was recommended that the manufacturers bind themselves under penalty of discipline to observe the Safety Code authorized by the Chamber’s Board of Governors; that
specific suggestions for increasing discipline and penalties for dangerous practices should be made to the Department of Commerce; and that the National Aeronautic Association should be requested to cooperate on a common policy for future air races and competitions.

It was interesting to note that despite generally depressed world economic conditions during 1930, American exports of aeronautical equipment remained at approximately the 1929 level, the highest previous year. The policy of many manufacturers who established export divisions late in 1929 to expand their markets was responsible for this favorable condition. The

Curtiss-Wright Export Corporation, General Motors Export Corporation and United Aircraft Exports, Inc., were separate units maintained by three of the great manufacturing groups to develop foreign markets. The Detroit Aircraft Corporation, Douglas Aircraft Corporation, Fairchild Airplane Manufacturing Company, and Nicholas-Beazley Airplane Company maintained active export divisions to further their development of world markets.

The Export Committee of the Aeronautical Chamber of Commerce directed the preparation of a new aviation cable code, known as "Avico," for use by aviation companies in sending or receiving foreign and domestic messages concerning their products. The code contained 30,000 words

* Complete table of American exports in Appendix.
and phrases, which included the listing of manufacturers' names, specifications of airplanes and motors, parts and parts assemblies, installations, export terms on shipping, boxing, price quotations, steamship lines, ports, banks and similar terms used in export communications. It was estimated conservatively that the new code would save members of the Chamber 30 per cent. of their domestic and foreign telegraph expenses. Through a clever and foolproof arrangement of code words, a maximum safety in transmission of messages was provided by the code. It was prepared and published in 1930 after months of study by experts within the industry and conferences with officials of the Department of Commerce.

The growing export business in South America prompted the Chamber's Export Committee to request the Aeronautics Trade Division of the Bureau of Foreign and Domestic Commerce to place two Aviation Trade Commissioners in South America. The Washington office of the Chamber prepared and published with the cooperation of the Bureau a "Handbook for the Aeronautic Exporter," which contained current information on all world markets for the American manufacturer interested in export business.

Glimpses of Three Score Factories

It is difficult to obtain a true picture of manufacturing progress made during the year in American plants. The refinements of engineering designs to increase the speed and efficiency of planes will be discussed in a
later chapter, "Out of the Engineering Laboratory." While necessarily brief, the following résumés of the year's activities in 61 of the best known aircraft manufacturing establishments, widely scattered throughout the country, should provide a general picture of the range of activities and the types of products offered. The manufacturers are listed alphabetically for convenience in future reference.

Aeromarine Klemm Corporation of Keyport, N. J., continued production of its two place, open cockpit, low wing monoplane. Two new models, the Aeromarine 85 and the Aeromarine 70 powered with Le Blond 85 and 70 horsepower engines respectively, were added to the Aeromarine 40, a model powered with the Salmson 40 horsepower engine. A building to house the paint and doping departments was added to the factory.

Aeronautical Corporation of America in Cincinnati, Ohio, was one of the new companies to enter actively the field during 1930. Until late in the year production and sales efforts were confined to the Aeronca C-2, a single place, open cockpit monoplane powered with a 30 horsepower engine manufactured by the company. During the latter part of the year, the Aeronca C-3, a side-by-side dual control, open cockpit monoplane was designed for training and sport purposes. Production facilities were increased during 1930 by addition of a motor experimental room and a section to house the finishing department.

Alexander Aircraft Company of Colorado Springs, Colo., continued production of its Eaglerock models, available in two distinct types of three place, open cockpit biplanes, known as the sport commercial and training types. Each type included models powered with Curtiss OX-5, Curtiss Challenger, Hispano A and E, Wright Whirlwind 240, and Kinner K-5 engines. The Eaglerock Bullet, a four place, low wing, cabin monoplane powered with a Wright Whirlwind 165 was added to the production line during the year. A primary and secondary type glider also was developed.

The American Aeronautical Corporation moved into a new factory located at Port Washington, N. Y., continued production of the S-56, a three place, open amphibian powered with a Kinner K-5, and supplemented this model with the S-56B, an amphibian of same general specifications powered with a Kinner B-5. Another type produced was the S-55, a double hull, 17 place flying boat powered with either two Wright Cyclones or two Isotta Fraschinis. Engineering was concentrated on adapting these Savoia-Marchetti designs to American production methods.

American Eagle Aircraft Corporation of Kansas City, Kan., continued production of its three place, open cockpit biplanes powered with Curtiss OX5, Kinner and Wright Whirlwind engines. A model known as the Tourplane, a four place, cabin monoplane also was placed in production. The American Eaglet, an open cockpit light monoplane, designed to carry either one or two persons, depending upon the power plant used, was
developed during 1930. It was equipped with a Cleone or Szekely engine and was especially designed for the private owner or student.

Amphibions, Inc., of Garden City, N. Y. (formerly Ireland Aircraft, Inc.), supplemented its line with the Privateer, a two place, open cockpit, side-by-side amphibian monoplane powered with a Warner Scarab motor. Other types produced were the N2B and the N2C, five place, open or closed cockpit, amphibian biplanes powered with a Wright Whirlwind 300 and a Pratt and Whitney Wasp respectively. The Engineering Department concentrated its efforts on a landing gear retraction system, wing tip float construction and general refinements of design. Early in 1930 the company moved into a new factory on Roosevelt Field.

Arrow Aircraft and Motor Corporation of Havelock, Nebr., continued production of its two place, side-by-side open cockpit biplane powered with Kinner or Le Blond engines.

Atlanta Aircraft Corporation of Atlanta, Ga., produced during 1930, an all metal eight place, low wing cabin monoplane powered with three Wright Whirlwind 240 engines. Especially designed for transport use the new plane was undergoing service tests at the close of 1930.

Bellanca Aircraft Corporation of New Castle, Del., placed the Bellanca Airbus, a combination mail and passenger cabin monoplane powered with
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a Curtiss Challenger, Pratt and Whitney Hornet or Wright Cyclone engine on the market. Another new model known as the Skyrocket, a six place, cabin monoplane powered with a Pratt and Whitney Wasp, was introduced. The Pacemaker was made available with a Packard Diesel, Pratt and Whitney Wasp, Jr. or Wright Whirlwind 300 engine.

B-J Aircraft Corporation of Baltimore, Md. (formerly Berliner-Joyce), continued experimental work on models for military use. The corporation was reorganized during 1930 as a unit of North American Aviation Company, a holding company.

Bird Aircraft Corporation of Brooklyn, N. Y. (formerly Brunner-Winkle Aircraft Corporation), continued production of their Bird model, three place, open cockpit biplane, powered with a Curtiss OX5 or Kinner K5 engine. During the latter part of 1930, a new model was produced known as the Bird CK, a four place, open cockpit biplane, powered with a Kinner B5.

Boeing Airplane Company of Seattle, Wash., a division of United Aircraft and Transport Corporation, produced six military and five commercial models during 1930. The military models were the P-12-C, a single place, pursuit plane, powered with a Pratt and Whitney Wasp engine superseding the P-12-B and the F-4-B-2, similar in general design to the P-12-C but provided with necessary equipment to adapt it for Navy purposes. The Model 218 was developed as a biplane fighter with a metal monocoque fuselage powered with a Pratt and Whitney Wasp engine. Model 202 was produced as a single place, all metal parasol type monoplane pursuit plane and Model XP-9 was designed as a single place, all metal fighter powered with a Curtiss Super Conqueror Engine. To supplement this line of military planes, the design of a Bomber was completed just prior to the close of the year. The five commercial models produced during 1930 were the Boeing 80-A, a 20 place, tri-motored transport, powered with three Pratt and Whitney Hornet engines; the Boeing 80-B of similar specifications to the 80-A with the exception that the pilot's compartment was open; the Boeing 40-B-4, a biplane powered with a Pratt and Whitney Hornet engine designed to carry four passengers in a cabin with an open rear cockpit for the pilot; the Monomail 200, a single place, low wing, all metal monoplane powered with a Pratt and Whitney Hornet specially designed for mail; and the Monomail 221, a ship of similar design accommodating six or eight passengers in a fuselage cabin in addition to mail.

Buhl Aircraft Company of Marysville, Mich., continued production of the Sport Airsedan, Standard Airsedan and Senior Airsedan during 1930. The first was a three place cabin sesqui-plane powered with Wright Whirlwind 240 or Wright Whirlwind 300. The second was a six place, cabin sesqui-plane, powered with a Wright Whirlwind 300, and the third was
an eight place, cabin sesqui-plane, powered with a Wright Cyclone or Pratt and Whitney Wasp or Hornet engine. In addition to these models a two place, low wing, open cockpit monoplane powered with a Wright Whirlwind 300 or a Pratt and Whitney Wasp was produced early in 1930.

Cessna Aircraft Company of Wichita, Kan., continued production of its standard four place, cabin monoplanes powered with Curtiss Challenger, Wright Whirlwind 240 or Wright Whirlwind 300 engines. During the latter part of 1930 experiments were made on a single place, open cockpit monoplane powered with a 30 horsepower motor. An open cockpit, mid-

wing monoplane powered with a Warner Scarab Engine especially designed for racing and a primary glider also were produced during 1930.

Command-Aire, Inc., of Little Rock, Ark., continued production of its Model 5-C-3, a three place, open cockpit biplane especially designed for sport and training with a Curtiss OX5, Wright Whirlwind 165, Wright Whirlwind 240, Lycoming, Axelson, Curtiss Challenger, or Warner Scarab engine. Especially designed for the sportsman pilot, the MR-1, known as the Little Rocket, was placed on the market. A low wing, single place, open cockpit monoplane powered with an American Cirrus engine, the Little Rocket won the All American Flying Derby.

Consolidated Aircraft Corporation of Buffalo, N. Y., continued produc-
motion of its PT and NY series of training planes for the Army and Navy. Through the purchase late in 1929 of Thomas Morse Aircraft, the company also produced the O19B, an all metal observation ship for the Army, and received a contract for 90 O19C's, a ship of similar specifications powered with a Pratt and Whitney Wasp engine. The Standard Fleet, a two place, open cockpit biplane powered with a Kinner K5, B5 or Warner Scarab engine was produced and supplemented by the addition of a DeLuxe model, including additional equipment and refinements. Production of Model 17 Fleetster, an eight place, cabin monoplane powered with a Pratt and Whitney Hornet, was continued and the Model 20, a six place parasol wing monoplane seating five passengers in a fuselage cabin with the pilot in an open rear cockpit was added. The Commodore flying boat, a 25 place ship powered with two Pratt and Whitney Hornets was produced with a new model refined to accommodate 30 passengers and a crew of three. An airport comprising 126 acres was added to the plant during 1930 and a hangar 70 by 100 feet constructed.

Cunningham-Hall Aircraft Corporation of Rochester, N. Y., completed development of their model PT-6, a six place cabin sesqui-plane powered with a Wright Whirlwind 300. Engineering work was concentrated on the development of a high lift wing which was first fitted to the two place ship entered by the company in the Guggenheim competition.

The Curtiss Aeroplane and Motor Company, a division of Curtiss-Wright Corporation, with plants in Garden City, L. I., and Buffalo, N. Y., confined itself in a large degree to the production of military aircraft. Production was continued on the N2C-2, a two place, open cockpit biplane powered with a Wright Whirlwind 240 designed as a primary trainer for the Navy; the Hawk P-6; a pursuit biplane powered with a Curtiss Conqueror engine, equipped for either water or Prestone cooling; the Falcon O-1E, an observation biplane powered with a Curtiss D-12; and the Falcon A-3B, an attack biplane also powered with the Curtiss D-12. During the year a new model was added known as the F8C4 Helldiver, a two place biplane fighter and diving bomber powered with a Wright Cyclone 575 engine and especially designed for the Navy. An F8C5 Helldiver, a ship of same general specifications, was supplied to the Marine Corps. The Command Helldiver, with closed cockpits, also was designed for the Navy. Several experimental ships were developed: the YP-20, a pursuit biplane with a Wright Cyclone, the XF-C-6 racer, a single place monoplane with a Curtiss high compression Conqueror, the O-1G, an observation biplane powered with a Curtiss D-12, and the YO-13C, XO-16 and O-26 observation biplanes, each powered with Curtiss Conqueror engines. For the commercial field, the company continued production of the Curtiss Condor, a twenty-one place biplane powered with two Curtiss Conquerors, the Falcon Mailplane, powered with a Wright Cyclone engine, and a training plane similar to the
N2C-2, powered with a Curtiss Challenger 185 or Wright Whirlwind 240.

Curtiss-Wright Airplane Company (formerly Curtiss-Robertson) of St. Louis, Mo., a division of the Curtiss-Wright Corporation, continued production of the Robin series, three place cabin monoplanes powered with Curtiss Challenger or Wright Whirlwind 165 engines. The model was supplemented during 1930 by a four place Robin, powered with a Curtiss Challenger or Wright Whirlwind 240. The production of the Moth, formerly manufactured by the Moth Aircraft Corporation, Lowell, Mass., also was carried on in the St. Louis plant. The Moth was a two place, open cockpit biplane powered with a Wright Gipsy engine and equipped with slots at the option of the purchaser. The Kingbird, an eight place cabin monoplane powered with two Wright Whirlwind 300 engines, was continued in production.

Curtiss-Wright Airplane Company (formerly Travel Air Manufacturing Company) of Wichita, Kan., a division of Curtiss-Wright Corporation, continued manufacture of their open and cabin airplanes especially designed for the commercial market. Current models produced during 1930 were the A-6000-A, a six place cabin monoplane powered with a Pratt and Whitney Wasp engine; the 6000-B, a ship of similar design powered with a Wright Whirlwind 300 engine and the four place cabin monoplane powered with a Wright Whirlwind 240. Open cockpit biplane models produced were 4-D, a three place ship powered with a Wright
Whirlwind 240; the Z4-D, a single place open cockpit biplane powered with a Wright Whirlwind 240, especially designed for crop-dusting; the E-4000, a three place ship with a Curtiss Challenger or Wright Whirlwind 165. Especially designed for the sportsman pilot, the Model S Mystery Ship was a single place, low wing monoplane powered with a Wright Whirlwind 300.

Davis Aircraft Corporation of Richmond, Ind., continued production of its two place open cockpit, parasol wing monoplane. In addition to the Model D-1, powered with a Le Blond 60, and the D-1K, powered with a Kinner K-5, additional models were produced known as the D-1-85 and the D-1L with the same general specifications but powered with a Le Blond 85 and Lambert 90 respectively. During the latter part of 1930 factory facilities were increased 50 per cent.

Detroit Aircraft Corporation of Detroit, Mich., concentrated the production activities of its member organizations during 1930. Production of the Ryan and Parks models was located in Detroit early in 1930. Manufacture of the Lockheed models was continued in Burbank, Cal. The Detroit plant produced the Ryan Brougham, a six place cabin monoplane powered with a Pratt and Whitney Wasp or a Wright Whirlwind 300; the Ryan Foursome, a new four place cabin monoplane powered with a Pratt and Whitney Wasp, Jr., or Wright Whirlwind 240; the Ryan Speedster, a new three place, open cockpit model; the Eastman flying boat, a four place open biplane powered with a Curtiss Challenger; the Eastman Amphibian, a new three place, open cockpit biplane powered with a Curtiss Challenger; the Parks T-1, a two place, open cockpit biplane powered with Curtiss OX5; and a primary glider, the Detroit Gull. The Lockheed plant produced the Lockheed Vega, a seven place, cabin monoplane powered with a Pratt and Whitney Wasp or Wright Whirlwind 300 constructed with either a wood or metal fuselage; the Lockheed Air Express, a five place parasol type wing monoplane seating four passengers in a fuselage cabin with an open cockpit for the pilot; the Lockheed Sirius, a two place, low wing, open cockpit monoplane powered with a Pratt and Whitney Wasp; and the Lockheed Mail Plane, a two place, low wing, open cockpit monoplane powered with a Pratt and Whitney Wasp.

Douglas Aircraft Company, Inc., of Santa Monica, Cal., continued the exclusive manufacture of military and mail planes. Production was maintained on adaptations of the O2 series, a two place observation plane, with O2-H and O2-K as the models for 1930. A contract for navy patrol boats and for planes to be used by the Chinese government was completed during the year.

Emsco Aircraft Corporation of Downey, Cal., continued production of the Emsco Cirrus, a two place center wing open cockpit monoplane, powered with an American Cirrus engine, and the Emsco Challenger, a tri-
motored eight place cabin monoplane powered with three Curtiss Challenger engines. A huge experimental plane of the standard Emsco center wing design was built for the Mexican government.

Fairchild Airplane Manufacturing Corporation of Farmingdale, N. Y., and Hagerstown, Md., a subsidiary of Fairchild Aviation Corporation which is a division of the Aviation Corporation, continued production of the Fairchild 71, a seven place, cabin monoplane, powered with a Pratt and Whitney Wasp; the Fairchild 42, a four place, cabin monoplane, powered with a Wright Whirlwind 300; the Fairchild KR-34, a three place, open cockpit biplane, powered with a Wright Whirlwind 165; and the

![Fairchild KR-21](image)

**FOR THE FLYING EXECUTIVE**

New Stearman Business Speedster (Wright Whirlwind), a three place open cockpit biplane, designed to suit the needs of the busy executive.

Fairchild KR-21, a two place, tapered wing, open cockpit biplane, powered with a Kinner K5.

Fokker Aircraft Corporation of America, a division of General Aviation Corporation, with factories at Hasbrouck Heights, N. J., Passaic, N. J., and Wheeling, W. Va., was controlled by General Motors, producing a widely diversified line of planes for the military and commercial market. The XO-27, a three place observation-reconnaissance monoplane with two 600 horsepower Curtiss Conqueror engines faired into the wings, was developed during 1930 for the Army Air Corps. The F-32, a 32 place cabin transport monoplane with four Pratt and Whitney Hornet engines
mounted in double tandem; the F-14, a high wing monoplane designed to carry six passengers and a cargo of mail powered with a Pratt and Whitney Hornet or Wright Cyclone engine; the F-11A, an eight place monoplane amphibian with a Pratt and Whitney Hornet or Wright Cyclone mounted above the wing; the F-10A, a 12 place tri-motored cabin monoplane with three Pratt and Whitney Wasp engines; and the Fokker Super-Universal, a seven place cabin monoplane powered with a single Pratt and Whitney Wasp engine, were continued in production as standard models. The Standard Universal was offered with a Wright Whirlwind 300 engine.

The Great Lakes Aircraft Corporation of Cleveland, O., a division of Allied Motor Industries, continued production of the 2Tr-A, a two place, open cockpit biplane, powered with an American Cirrus engine and the TG-1, a three purpose bombing, torpedo and observation plane for the Navy. The company also produced metal and wood floats on contract for the Navy.

The Hall-Aluminum Aircraft Corporation of Buffalo, N. Y., increased its factory space by 33,000 feet and added personnel. Production was started on an order of twin-engined flying boats for the Navy, each powered with two Wright Cyclone engines. A four engine patrol plane also was developed for the Navy.

Huntington Aircraft Corporation of Bridgeport, Conn., produced a two place, cabin monoplane, powered with a Warner Scarab engine. During the latter part of the year, the company experimented with a light plane especially designed for the private owner.

Inland Aircraft Corporation of Kansas City, Kan., moved into a new plant adjacent to Fairfax Airport and continued production of its two place side-by-side parasol type monoplane powered with Le Blond or Warner engines. During the latter part of 1930, an all metal ship similar in specifications to the Standard Inland Sport was designed.

Kellett Aircraft Corporation of Philadelphia, Pa., prepared for production of the Autogiro under license of the Pitcairn-Cierva Autogiro Company.

Keystone Aircraft Corporation of Bristol, Pa., a division of the Curtiss Wright Corporation, concentrated its production on military models. For the Army, it produced the B-3A, the YB4 and the YB5 bombing planes powered with two Pratt and Whitney Hornets or two Wright Cyclones. Production was continued on the OA-2 amphibian powered with a Wright Tornado engine. For the Navy, it produced the PK-1 flying boat powered with two Wright Cyclone engines and the OL-9 amphibian powered with a Pratt and Whitney Wasp. For the commercial field the Commuter, a four place amphibian biplane powered with a Wright Whirlwind 300 and the Air Yacht, an eight place, cabin amphibian, powered with a Wright Cyclone engine, were in production.
MANUFACTURING AMERICAN AIRCRAFT

The E. M. Laird Airplane Company of Chicago, Ill., continued manufacture of its three place open cockpit biplanes powered with Wright Whirlwind engines. The LC-DW 300, a single place biplane, powered with a Pratt and Whitney Wasp, Jr., was designed and won the Thompson Trophy race in Chicago.

Lincoln Aircraft Company of Lincoln, Nebr., continued production of its P-3 series, a two place, open cockpit biplane, powered with Curtiss OX5 or Kinner K5, and added the Lincoln AP, a new three place cabin monoplane powered with a Kinner K5 or Kinner B5 engine.

The Glenn L. Martin Company of Baltimore, Md., produced two new types of patrol-bombing planes for the U. S. Navy during 1930. The XT5M-1, a biplane diving bomber, and the XT6M-1, a carrier torpedo biplane, were the new models introduced. Production was continued on the PM-1 and PM-2, twin-motored biplane patrol-bombing flying boats, and the P3M-1 and XP2M-1, tri-motored monoplane flying boats. Pratt and Whitney Wasps and Hornets or Wright Whirlwinds and Cyclones were used to power these models.

Mercury Aircraft, Inc., of Hammondsport, N. Y., produced their Model T-2, an all metal open cockpit training plane powered with a Le Blond engine.
Metal Aircraft Corporation of Cincinnati, O., continued production of the G-2-W, an eight place all metal cabin monoplane powered with a Pratt and Whitney Wasp, and the G-2-H, a similar ship powered with a Pratt and Whitney Hornet engine.

Mono Aircraft Corporation of Moline, Ill., continued production of the Monocouche, a four place, cabin monoplane, powered with a Wright Whirlwind 240; the Monoprep, a semi-cabin monoplane, powered with a Lambert M-5 engine; and the Monocoupe 60, a two place, cabin monoplane, powered with a Lambert M-5 engine. Four new models were added during 1930: the Monocoupe 90, a two place, cabin monoplane, powered with a Lambert 90; the Monocoupe 110, powered with a Warner Scarab; the Monocoupe 90-J, powered with a Warner Scarab, Jr.; and the Monocoupe 125, powered with a Kinner B-5.

Mooney Aircraft Corporation of Wichita, Kan., moved into a new factory adjoining the Wichita Municipal Airport, and produced its Model A-1, a four place cabin low wing monoplane, powered with a Kinner K-5 and its Model A-2, a ship of similar specifications powered with the Kinner B-5.

New Standard Aircraft Corporation of Paterson, N. J., continued production of its D-25 series of five place open cockpit biplanes powered with Wright Whirlwind 240 engines, and its D-26 series, three place open cockpit biplanes powered with Wright Whirlwind 240 engines. Model D-27, a single place biplane powered with a Wright Whirlwind 240 was especially designed for mail transport. Model D-25-B, a five place open cockpit biplane powered with a Wright Whirlwind 300; the Model D-25-C, a five place cabin biplane with the pilot in an open cockpit and powered with a Wright Whirlwind 240; and the D-29 series, a two place open cockpit biplane with a Kinner K-5 or Kinner B-5, were produced. A further development of the D-29 series was the D-31 and the D-32 models with the same general specifications but powered with Kinner B-5 and Wright Whirlwind 165 engines respectively. The NT-1, a two place open cockpit biplane, was supplied to the Navy on contract.

Nicholas Beazley Airplane Company, Inc., of Marshall, Mo., continued production of their Barling NB-3, a three place open cockpit low wing monoplane powered with Le Blond, Velie or Genet engines. During 1930, a new model was produced known as the NB-4, a ship of similar specifications to the NB-3 but powered with either a Lambert 90 or a Warner Scarab, Jr., engines.

Northrop Aircraft Corporation of Burbank, Cal., a division of United Aircraft and Transport Corporation, produced the Alpha, an all metal low wing seven place cabin monoplane with the pilot in an open cockpit. It was powered with a Pratt and Whitney Wasp engine. Considerable atten-
TWIN-ENGINED KINGBIRD

Curtiss Kingbird, an eight place cabin monoplane powered with two Wright Whirlwind engines, is designed especially for light transport.

MONOCOQUE FUSELAGE FOR BOMBER

Martin XT5M-1 Diving Bomber, showing the use of metal monocoque construction in the fuselage illustrative of the new trend.
tion was paid to experimental development of a "flying wing" type and a small experimental ship was successfully flown.

Pitcairn Aircraft, Inc., of Willow Grove, Pa., continued production of its PA-7, powered with a Wright Whirlwind 240 horsepower engine. It was available in two types: a three place open cockpit biplane or a single place biplane especially designed for mail and express. During 1930, a new model known as the PA-8 was produced with a Pratt and Whitney Wasp, Jr., or Wright Whirlwind 300. Late in the year, the company entered commercial production of the autogiro under license of the Pitcairn-Cierva Autogiro Company. The models which were available were three place ships powered with either a Pratt and Whitney Wasp, Jr., or a Wright Whirlwind 300.

Pitcairn-Cierva Autogiro Company of Philadelphia, Pa., held the American rights to the development of the Cierva Autogiro and carried on considerable experimental work to improve the flying characteristics of the machine before it was offered to the general market. Toward the close of the year, the company announced that it was prepared to enter into negotiations with responsible American companies to manufacture the Autogiro under a patent agreement. This company did not plan to manufacture the machines under its own name, but offered its engineering resources to aid other manufacturers who might begin production under rights granted them. Possibly the greatest advancement made during 1930 in the development of the Autogiro was the powering of the rotating wings from the engine to shorten the necessary time for taxiing before a take-off.

Pittsburgh Metal Airplane Company of Pittsburgh, Pa., continued development of the Thaden T-4, a five place cabin monoplane powered with a Wright Whirlwind 300. This ship is of all metal construction.

Prest Airplane and Motor Company of Arlington, Cal., late in 1930 commenced production of its Baby Pursuit model, a single place, parasol wing monoplane, powered with Szekely engine.

Rearwin Airplanes, Inc., of Kansas City, Kan., during 1930 moved into a new factory adjacent to Fairfax Airport and continued production of its three place open cockpit biplane powered with a Curtiss Challenger or Continental engine.

Sikorsky Aviation Corporation of Bridgeport, Conn., a division of United Aircraft and Transport Corporation, completed moving into its new factory during the early part of 1930. Production was continued on the S-38 which was increased from 10 to 12 place. A cabin amphibian, it was powered with two Pratt and Whitney Wasps or two Pratt and Whitney Hornets. During 1930 several new amphibian types were introduced. They were the S-39, a four to five place monoplane powered with a Pratt and Whitney Wasp, Jr.; the S-41, a 16 place cabin monoplane powered with two Pratt and Whitney Hornet engines; and the S-40, a 41
place monoplane amphibian powered with four Pratt and Whitney Hornets. When completed in 1931 the S-41 will be the largest plane in America and the world's largest amphibian.

Solar Aircraft Company of San Diego, Cal., produced the MS-1, an eight place, all metal, cabin monoplane powered with a Pratt and Whitney Wasp engine.

Spartan Aircraft Company of Tulsa, Okla., continued production of its C-3 series of three place, open cockpit biplanes. The series was available powered with the Wright Whirlwind 165 or Wright Whirlwind 240. New models produced were the C-4 series, a four place cabin monoplane

FORD AIRPORT AT DEARBORN

With an airport hotel under construction in the right background, Ford airport is keeping pace with its traffic needs. Ford airplane factory, engineering laboratory and museum also are seen in the foreground.

with a Wright Whirlwind 240 or Wright Whirlwind 300, and the C-5 series, a five place cabin monoplane powered with a Pratt and Whitney Wasp, Jr., or a Wright Whirlwind 300.

Stearman Aircraft Company of Wichita, Kan., a division of United Aircraft and Transport Corporation, late in 1930 moved into its new factory adjacent to the Municipal Airport in Wichita and continued production of its model C-3R, a three place open cockpit biplane, powered with a Wright Whirlwind 240, and the Junior Speed Mail series, three place open cockpit biplanes powered with a Wright Whirlwind 300, Pratt and
Whitney Wasp, Jr., or Pratt and Whitney Wasp. The series also was available as single place mail transports. During the latter part of 1930, the company received a contract from the Army for its Model 6A, two place open cockpit biplanes powered with Wright Whirlwind 165 engines. The commercial version of the ship known as the Cloud Boy series was powered with a Wright Whirlwind 165, Continental or Pratt and Whitney Wasp, Jr.

Stinson Aircraft Corporation of Wayne, Mich., continued production of its Stinson, Jr. series of four place cabin monoplanes available in models SM-7A, SM-7B, SM-8A, SM-8B and SM-8D. These models were powered with the Wright Whirlwind 300, Pratt and Whitney Wasp, Jr., Lycoming, Wright Whirlwind 240, and Packard Diesel engines, respectively. In addition to the Junior series, the Stinson Detroiter, a six place cabin monoplane powered with a Wright Whirlwind 300; the SM-6B, an eight place cabin monoplane powered with a Pratt and Whitney Wasp; and the SM-6000, a 12 place cabin monoplane powered with three Lycomings, were manufactured.

Stout Metal Airplane Company of Dearborn, Mich., a division of the Ford Motor Company, early in 1930 opened an addition to its former plant comprising 110,000 square feet of floor space. Production was continued on the Model 4-AT, a 14 place cabin monoplane powered with three Wright Whirlwind 300 or three Pratt and Whitney Wasp, Jr., engines. The 5-AT and 5-AT-C, 17 place cabin monoplanes powered with three Pratt and Whitney Wasp engines, and the 7-AT, a 15 place cabin monoplane powered with one Pratt and Whitney Wasp and two Wright Whirlwind 300 engines, were in production. A new model was introduced during the latter part of the year designated as model 8-A, a two place cabin monoplane powered with a geared Wright Cyclone engine, suitable for express transport. Engineering efforts of the company were concentrated on the development of greater top speed for the current models through aerodynamic cleanliness.

St. Louis Aircraft Corporation of St. Louis, Mo., continued production of its Cardinal series of two place cabin monoplanes. These ships were available with Kinner K-5, Le Blond 90 and Le Blond 65 engines.

Swallow Airplane Manufacturing Company of Wichita, Kan., continued production of its TP series, a two place open cockpit biplane. Several models were available powered with Curtiss OX5, Kinner K-5 or Warner Scarab engines. The F-28-AX, a three place open cockpit biplane powered with an Axelson engine, also was continued in production.

Timm Airplane Corporation of Los Angeles, Cal., continued production of its Collegiate K-90, a two place open cockpit parasol monoplane powered with a Kinner engine.

Verville Aircraft Company of Detroit, Mich., produced late in 1930
the Sport Trainer, a two place open cockpit biplane powered with a Continental engine. Production was continued during the year on the Air Coach, a four place cabin monoplane with a Wright Whirlwind 240 or Packard Diesel.

Viking Flying Boat Company of New Haven, Conn., manufactured the Viking, a four place open cockpit flying boat powered with a Wright Whirlwind 240. Production also was continued on the Kitty Hawk, a three place open cockpit biplane powered with a Kinner K-5 engine. During the latter part of the year experiments were being made on the design of a four place amphibian.

FORD EQUIPPED WITH FIRESTONE BALLOON TIRES

Chance Vought Corporation of Hartford, Conn., a division of United Aircraft and Transport Corporation, early in 1930 moved into its new factory adjacent to the United Airport at Hartford. The plant contained some 175,000 square feet of floor space. Production was concentrated on the Corsair, a two place observation-fighting ship powered with a Pratt and Whitney Wasp, for the Navy. Some of these ships delivered to the Navy were equipped with amphibian landing gear. During the latter part of the year experiments were made on a newly designed observation ship of all metal construction. The Corsair also was supplied to private owners.

Waco Aircraft Company of Troy, O., early in 1930 introduced a new model known as the "F." A three place open cockpit biplane, it was
available with a Kinner K5, Kinner B5 or Warner Scarab. Other models produced were the CSO, a three place open cockpit biplane powered with a Wright Whirlwind 240; the CTO, a three place open cockpit taper wing biplane powered with a Wright Whirlwind 240; and the QSO, a ship of the same general specifications as the CSO but powered with a Continental engine. The CSO and CTO also were available with Packard Diesel engines. The company produced a primary glider and experiments were under way on a light plane powered with the Continental engine.

Whittlesey Manufacturing Company of Bridgeport, Conn., continued production of the Avian, a two place open cockpit biplane powered with an American Cirrus engine and equipped with slotted wings at the option of the customer. The company also prepared to produce a small amphibian, and experimental work on its design was under way late in the year.

**Accessories, Equipment and Materials**

The development of new designs and refinement of existing types in the field of accessories, equipment and materials which make up component parts of a finished airplane were not retarded during 1930 as a result of the general business depression. Conversely, many of the well-established manufacturers contributing to this field pressed programs for new researches which might expand their market in the aircraft industry and make up for deficiencies in older fields which they have been serving for decades.

An examination of the method of fabricating an airplane will make clear the significance of this aggressive attitude on the part of accessory and material manufacturers. In reality, the word "accessory" is a misnomer as generally applied to parts going into the construction of aircraft. They are really component parts manufactured by specialists and supplied to aircraft manufacturers engaged in the design and final fabrication of the finished product. Some of the more important technical advances made in this field during 1930 will be reviewed in a later chapter, "Out of the Engineering Laboratory." It should be interesting here to get some conception of the wide range of allied industries contributing to the finished airplane. Corporations making contributions to the development of component parts for engines will be considered in the next chapter.

Wheels and brakes were perfected and produced by the Bendix Brake Company, a division of the Bendix Aviation Corporation, and the Kelsey Hayes Wheel Company. Pontoons were manufactured by Edo Aircraft Company, Aircraft Products Corporation of America, Brewster and Company, and Seymour J. Baum, Inc. Rubber tires for aircraft were especially perfected by Firestone Tire and Rubber Company, General Tire and Rubber Company, Goodyear Tire and Rubber Company, B. F. Goodrich
Rubber Company, and U. S. Rubber Company. Shock absorbers and struts were the specialty of Cleveland Pneumatic Tool Company, Gruss Air Spring Company, and Russell Manufacturing Company.

Aluminum Company of America, Bohn Aluminum and Brass Company, Carpenter Steel Company, International Nickel Company, Ohio Seamless Tube Company and Steel and Tubes, Inc., were among the principal contributors to the development of metal castings, forging and tubing. The Canton Drop Forging and Manufacturing Company, Endicott Forging and Manufacturing Company, Inc., U. S. Chain and Forging Company, and Wyman Gordon Company were specializing in drop forgings and castings for the industry. Welding equipment was supplied principally by Air Reduction Sales Company and Linde Air Products, Inc., while most of the shop equipment was developed by Black and Decker Manufacturing Company, Ex-Cell-O Aircraft and Tool Corporation, Gaul, Deer and Shearer Company, Indianapolis Tool and Manufacturing Company, and the Meisel Press Manufacturing Company.


As pointed out in earlier chapters, the development of instruments and radio equipment to aid in the navigation of airplanes through all kinds of weather has been a major factor in the maintenance of air transport schedules and in raising the standard of aircraft reliability. The chief contributors to progress in the instrument field were American Askania Corporation, American Paulin System, Elgin National Watch Company, Moto-Meter Gauge and Equipment Corporation, Pioneer Instrument Company, a division of Bendix Aviation Corporation, and Sperry Gyroscope Company. In the radio field, the Aircraft Radio Corporation, Breeze Corporation, American Telephone and Telegraph Company, Radiomarine Corporation, and Western Electric Company, Inc., made outstanding contributions.

Five companies continued the development of parachutes and safety devices. They were Irving Air Chute Company, Inc., Follmer Cogg and Company, Russell Parachute Company, Switlik Parachute and Equipment Company, and Triangle Parachute Company. Flying togs, goggles or
wearing apparel for pilots were the specialties of A. G. Spaulding and Bros., Boehmke Optical Company, and E. B. Meyrowitz, Inc.

The Aero Supply Manufacturing Company, Air Transport Equipment, Inc., and Johnson Airplane and Supply Company acted as general wholesales for supplies. Other companies specializing in products for aircraft included: Imperial Brass Company, sanitary equipment; John A. Roebling's Sons, cable; Russell Manufacturing Company, brake lining and shock cord; S. S. White Dental Manufacturing Company, small tubing; Packard Electric Company, electric cable; Eastman Kodak Company, photographic equipment; Detroit Steel Products; Tubular Rivet and Stud Company; and Parker Appliance Company, couplings.
CHAPTER X

PRODUCING AMERICAN ENGINES

Engine Refinements Increase Aircraft Efficiency—Superchargers and Higher Compression Ratios Used—Better Fuels Perfected—Diesel Engine Introduced—Activities of Principal Manufacturers

Increased reliability and efficiency of aircraft was the direct result of refinements made on aircraft engines in production and the development of new models during 1930. Engine failure, the cause of many forced landings in the early days of flying, had become so infrequent that it was no longer a source of concern to the operator who maintained a careful inspection of his equipment. The life of an engine had been materially increased and the costs of operation were consequently reduced.

Low weight and exceptional horsepower were the two characteristics fused into the aircraft engine to make it the most efficient known to the world since the combustion principle was first employed. Through employment of high compression pistons and superchargers, manufacturers made great strides during 1930 in increasing the horsepower of their standard models without materially increasing the weight. The result was the development of airplanes with greater pay loads in proportion to gross load.

In all these engines, the weight-horsepower ratio was reduced by continued "stepping-up" of power. The usual procedure was to effect the power increase by supercharging, operating at greater crankshaft speeds, and using higher compression ratios. Higher cylinder temperatures for higher thermal efficiency also were permitted with both liquid-cooled and air cooled engines. These engines necessarily required a relatively higher grade of fuel and lubricating oil, because of the necessity of preventing detonation and because of higher bearing pressures and cylinder temperatures.

Recognizing that the continued development of the aircraft engine depends, in a large measure, on the availability of better fuels and lubricants, leading oil companies carried on extensive research which resulted in definite improvement of aviation fuels, particularly with regard to knock rating. Record breaking flights of Capt. Frank Hawks, Lieut. James Doolittle and Charles "Speed" Holman were made possible through the use of better fuels. Power outputs of the engines used were increased from 300 horsepower to 425 horsepower due to the availability of anti-knock gasoline capable of use under conditions of high pressure and high temperature.
The Motor Manufacturers’ Section and the Fuel and Lubricants Section of the Aeronautical Chamber of Commerce both played an important part during 1930 in investigating the principal problems associated with this work. The development of a uniform safety code for the handling of aviation gasoline, the establishment of a code of ethics and commercial practice for the marketing of aviation fuels and lubricants,* and the correlation of technical research activities of the several interested societies were definitely achieved during the year by the Fuels and Lubricants Section. The Motor Manufacturers’ Section worked with the Department of Commerce on necessary changes in the requirements for manufacturing engines, and worked on a system of discounts to the aircraft manufacturer and distributor and dealer, which might prove equitable to all concerned.

The predominant position of American aircraft engines was evidenced from their wide use in all parts of the world. Foreign manufacturers often selected American engines for installation in aircraft required to perform an exceptionally difficult task. Twelve Curtiss Conqueror engines were installed in the giant Dornier DO-X when it was prepared for its projected trans-Atlantic trip. Pratt and Whitney Hornet engines powered giant Junkers charged with the Herculean task of transporting tons of gold mining machinery into the heart of British New Guinea. The Royal Dutch Air Lines selected Pratt and Whitney Wasps to power their Dutch-built Fokkers on the new route from Amsterdam to Java. Wright Whirlwinds were powering Fokkers of Swiss Belair Airlines over the treacherous Alps and Pyrenees between Munich, Germany, and Barcelona, Spain. In Canada, China, Japan, and most of the countries of Europe and Latin America, American engines of some make were in daily use. Some of them were constructed under licensing arrangements with foreign representatives, others were imported from the United States.

**Diesel Engine Introduced**

The introduction of a Diesel type aircraft engine and the successful testing of a new fuel injection engine using oil or gasoline were outstanding technical developments during 1930. These and other technical achievements in the engine field will be discussed in a later chapter, “Out of the Engineering Laboratory.” It is sufficient to say here that the developments of the year were an inspiration to designers striving to develop planes carrying greater pay loads.

The Department of Commerce listed 68 manufacturers of aircraft engines in the United States toward the middle of 1930. However, only 30 of these were manufacturing under Approved Type Certificates issued by the Department of Commerce. Sixty-five Approved Type Certificates

* Code printed in Appendix.
MODERN PRODUCTION MACHINERY

General view of the connecting rod department of the Pratt and Whitney Aircraft Company in East Hartford, Conn., showing equipment used.

MODERN ENGINE PLANT

New factory of the Pratt and Whitney Aircraft Company at East Hartford, Conn., is illustrative of the strides made in providing better manufacturing facilities.
for engines had been issued by the Department of Commerce since it began its inspection work in 1927, and 29 of these were issued during 1930.

The design of light airplanes for the private flier to sell in the $1,000 class prompted several engine manufacturers to develop two to four cylinder engines during 1930 for this purpose. The two cylinder Aeronca engine, four cylinder Continental, and three cylinder Szekely were outstanding examples of this trend.

Manufacturing Résumé

A brief résumé of the year's activities in each of the major engine manufacturing plants should provide a fair picture of developments in this field.

1930 Production and Sales—Commercial Aircraft Engines—By Types

and the types of products offered for both the commercial and military markets. They follow, arranged in alphabetical order for convenience in future reference.

Allison Engineering Company of Indianapolis, Ind., a division of General Motors, concentrated on experimental work for the Army and Navy and on the design on new engines for the commercial field, the character of which had not yet been announced at the close of 1930.

American Cirrus Engines, Inc., a subsidiary of the Allied Motor Industries, Inc., produced the American Cirrus, a four cylinder in-line air cooled
CURTISS, LYCOMING AND FAIRCHILD

Curtiss Geared Conqueror, 600 horsepower (upper left); Curtiss D-12, 435 horsepower (upper right); Lycoming R-680, 215 horsepower (center left); Curtiss Challenger, 185 horsepower (center right); Fairchild 6-390, 120 horsepower (lower left); and Fairchild V-770, 240 horsepower (lower right).
engine rated at 95 horsepower at 2,100 revolutions per minute, at its Marysville, Mich., plant.

E. W. Bliss Company of Brooklyn, N. Y., prepared to manufacture the Jupiter engine, a nine cylinder radial air cooled engine under its American rights to the patents of the Bristol Aeroplane Company of England.

Chevrolet Aircraft Corporation of Baltimore, Md., closely affiliated with the Glenn L. Martin Company, moved its factory from Indianapolis early in 1930 and continued experimental work on a four cylinder inverted in-line air cooled engine. Late in the year, the engine designated as model 333 successfully passed the Department of Commerce test for an Approved Type Certificate. Rated at 120 horsepower at 2,100 revolutions per minute, production of the new model was started during the closing months of the year.

Comet Engine Corporation of Madison, Wis., continued production of its model 7-E, a seven cylinder radial air cooled engine rated at 165 horsepower at 1,900 revolutions per minute.

Continental Aircraft Engine Corporation of Detroit, Mich., a subsidiary of Continental Motors, began production of its model A-70, a seven cylinder radial air cooled engine rated at 165 horsepower at 2,000 revolutions per minute, early in 1930. A new four cylinder horizontally opposed air cooled L-head engine designed to develop 35 horsepower at 2,500 revolutions per minute was developed late in 1930.

Curtiss Aeroplane and Motor Company of Buffalo, N. Y., a division of the Curtiss-Wright Corporation, produced three distinct models during 1930. The Conqueror was a 12 cylinder V-type Prestone or water-cooled engine rated at 600 horsepower at 2,400 revolutions per minute. The engine was available with direct drive or with a 2:1 reduction gear which turned the propeller at half crankshaft speed. The D-12 was a 12 cylinder V-type water-cooled engine rated at 435 horsepower at 2,250 revolutions per minute. The Challenger was a six cylinder radial air cooled engine. Its rating was increased early in 1930 to give it 185 horsepower at 2,000 revolutions per minute.

Dayton Airplane Engine Company of Pawtucket, R. I., moved its factory from Dayton, O., during the year and continued development of its in-line air cooled engines.

Fairchild Engine Corporation of Farmingdale, N. Y., a division of the Aviation Corporation, started production late in 1930 on a six cylinder inverted in-line air cooled engine rated at 120 horsepower at 2,150 revolutions per minute. The model, developed during 1930, was designated as the Fairchild 6-390. Experimental development of a 12 cylinder inverted V-type engine designed to produce 240 horsepower at 2,150 revolutions per minute was under way late in the year.

Jacobs Aircraft Engine Company of Camden, N. J., completed experi-
PRODUCING AMERICAN ENGINES

PRATT AND WHITNEY ENGINES

Wasp, Jr., 300 horsepower (upper left); Wasp Direct Drive Series C, 450 horsepower military rating, 425 horsepower commercial rating (upper right); Hornet Series B, 575 horsepower (center left); Hornet Series B Geared, 550 horsepower (center right); Hornet Direct Drive Series A-1, 525 horsepower (lower left); and Hornet Series A-1 Geared, 500 horsepower (lower right).
ment work early in 1930 on a seven cylinder radial air cooled engine rated at 190 horsepower at 1,800 revolutions per minute. Production of this model was started and experiments were under way on a two-cylinder opposed air cooled engine designed to produce 25 horsepower at 3,000 revolutions per minute.

Kinner Airplane and Motor Corporation of Glendale, Calif., continued production of its model K-5, a five cylinder radial air cooled engine rated at 100 horsepower at 1,800 revolutions per minute. Several refinements were made on the model Kinner C-5, a five cylinder radial air cooled engine rated at 210 horsepower at 1,900 revolutions per minute. Service facilities for these engines throughout the country were expanded during the year.

Lambert Aircraft Engine Corporation of St. Louis, Mo., continued production of the M-5, a five cylinder radial air cooled engine rated at 65 horsepower at 1,900 revolutions per minute. Early in the year, production also was started on the R-266, a five cylinder radial air cooled engine rated at 90 horsepower at 2,375 revolutions per minute.

Le Blond Aircraft Engine Corporation of Cincinnati, Ohio, produced the Le Blond 70, 85 and 110 during 1930 and discontinued the Le Blond 60 and 90 in favor of the newer models. The 70, designated as model 5-DE, was a five cylinder radial air cooled engine rated at 70 horsepower at 1,950 revolutions per minute. The 85, known as model 5-DF, was a five cylinder radial air cooled engine rated at 85 horsepower at 2,125 revolutions per minute. The 110, named model 7-DF, was a seven cylinder radial air cooled engine rated at 110 horsepower at 2,150 revolutions per minute.

Light Manufacturing and Foundry Company of Pottstown, Pa., continued production of the Brownback Tiger model C-400, a six cylinder radial air cooled engine rated at 90 horsepower at 1,700 revolutions per minute. The model was formerly produced by the Brownback Motor Laboratories which were taken over early in the year by the Light Manufacturing and Foundry Company.

Lycoming Manufacturing Company of Williamsport, Pa., affiliated with the Cord Corporation, started production early in the year on their model R-680, a nine cylinder radial air cooled engine rated at 215 horsepower at 2,000 revolutions per minute. It superseded the former model known as the R-645.

Packard Motor Car Company of Detroit, Mich., introduced its Diesel Aircraft Engine early in 1930 after several years of development work. A new plant was completed for building the engine, a Department of Commerce Approved Type Certificate was obtained, and production of the new engine started. A radial internal combustion engine burning ordinary furnace oil and rated at 225 horsepower at 1,950 revolutions per minute, the new Diesel type engine had no carburetor, magneto or spark plugs.
Cyclone, 575 horsepower (upper left); Cyclone, 525 horsepowe (upper right); Whirlwind, 300 horsepower (center left); Whirlwind, 240 horsepower (center right); Whirlwind, 165 horsepower (lower left); and Gipsy, 90 horsepower (lower right).
Ignition was obtained by spraying fuel into air, compressed in the cylinders until it reached a temperature of about 1,000 degrees Fahrenheit. Because of the simplicity of construction and greatly reduced number of parts, it could be disassembled in 17 minutes. The company also continued production of its water-cooled engines of 600, 800 and 1,000 horsepower. These were known as the Packard 1500 and Packard 2500 models.

Pratt & Whitney Aircraft Company of East Hartford, Conn., a division of United Aircraft and Transport Corporation, began production January 1, 1930, in a new plant containing 500,000 square feet of manufacturing space devoted exclusively to the manufacture of aircraft engines. Production was continued on the Series C Wasp, a nine cylinder radial air cooled engine rated at 420 horsepower at 2,000 revolutions per minute; the Series A-1 Hornet, a nine cylinder radial air cooled engine rated at 525 horsepower at 1,900 revolutions per minute; and the Series B Hornet, a nine cylinder radial air cooled engine rated at 575 horsepower at 1,950 revolutions per minute. Early in the year, production also was started on the Wasp Junior, a nine cylinder radial air cooled engine rated at 300 horsepower at 2,000 revolutions per minute. The Wasp Junior also was available with a supercharger to develop 400 horsepower at 2,300 revolutions per minute at 4,000 feet. Late in 1930, the Series D Wasp, a supercharged high compression engine rated at 500 horsepower at 2,200 revolutions per minute, was placed in production. The Series A-2 Hornet, a development of the A-1, with 525 horsepower at 1,900 revolutions per minute, was put on the market in the summer of 1930. Geared engines available included: the Series C Wasp with 5:4 reduction drive and 2:1 reduction drive; the A-2 Hornet with 2:1 reduction drive; and the Series B Hornet with 3:2 and 2:1 reduction gear drives. The Pratt and Whitney reduction gear drives were manufactured under patents held by the company. One of the organization's most interesting experimental developments during the year centered around a device which eliminated the usual carburetor and intake system of the gasoline engine. The new injection system measured the fuel precisely and delivered it mechanically to each cylinder. The atomization was so perfected that a large range of fuels could be used, including both furnace oil and aviation gasoline. Continued development of the device was planned for 1931.

Szekely Aircraft and Engine Company of Holland, Mich., produced a three cylinder radial air cooled L-head engine rated at 30 horsepower at 1,750 revolutions per minute; a three cylinder radial air cooled engine rated at 45 horsepower at 1,750 revolutions per minute; and two five cylinder radial air cooled engines designed to develop 65 and 70 horsepower. These two engines differed in that one was an L-head type and the other employed overhead valves.

Western Enterprise Engine Company of Los Angeles, Cal., manufac-
Comet, 150 horsepower (upper left); Packard Diesel, 225 horsepower (upper right); Kinner B-5 or K-5, 125 or 100 horsepower (center left); Kinner C-5, 210 horsepower (center right); Warner Scarab, 100 horsepower (lower left); and Warner Scarab Junior, 90 horsepower (lower right).
tured a seven cylinder radial air cooled L-head engine rated at 130 horsepower at 1,850 revolutions per minute.

Warner Aircraft Corporation of Detroit, Mich., continued production of the Warner Scarab, a seven cylinder radial air cooled engine rated at 100 horsepower at 1,850 revolutions per minute. During the year, the company also introduced the Warner Scarab Junior, a five cylinder radial air cooled engine rated at 90 horsepower at 2,025 revolutions per minute.

Wright Aeronautical Corporation of Paterson, N. J., and St. Louis, Mo., unit of the Curtiss-Wright Corporation, continued production of its Gipsy engine, its Whirlwind series and its Cyclone series. The Gipsy, a four cylinder in-line air cooled engine rated at 90 horsepower at 1,950 revolutions per minute, went into operating service for training and sport planes. The Whirlwind J-6 series included the Whirlwind 165, a five cylinder radial air cooled engine rated at 165 horsepower at 2,000 revolutions per minute; the Whirlwind 240, a seven cylinder radial air cooled engine which had its rating raised during 1930 from 225 to 240 horsepower at 2,000 revolutions per minute; and the Whirlwind 300, a nine cylinder radial air cooled engine rated at 300 horsepower at 2,000 revolutions per minute. To this Whirlwind series was added a supercharged high compression nine cylinder engine of 975 cubic inch displacement rated at 400 horsepower at 2,300 revolutions per minute. To the radial air cooled nine cylinder Cyclone Series, which previously included only the engine of 1,750 cubic inch displacement rated at 525 horsepower at 1,900 revolutions per minute, was added a new Cyclone of 1,820 cubic inch displacement rated at 575 horsepower at 1,900 revolutions per minute. Both Cyclones included many new engineering developments of which the new baffles for cooling were considered outstanding. The air cooled V-type Tornado series produced for military purposes was expanded during 1930 to include a new engine of 1,560 cubic inch displacement, an engineering development from the 1,460 cubic inch displacement engine of former years. The Wright spark plug cooler, centrifugal clutch, and offering of geared drive engines in the 165, 240, 300, 525 and 575 horsepower classes were among the year's developments in Whirlwinds and Cyclones. Geared engines were available in the Whirlwind and Cyclone series with a 2:1 reduction drive and 1.58:1 reduction drive.

Refinement of Component Parts

The increased efficiency of aircraft engines during 1930 was, in part, the result of refinements made on component parts manufactured by a score of companies contributing to the final product. Just as specialists contributed to the development of accessories and equipment necessary in airplane construction, so a host of well-established companies were improving the products necessary in the final assembly of an aircraft engine.
Szekely SR-5, 70 horsepower (upper left); Continental A-70, 165 horsepower (upper right); Szekely SR-3, 30 horsepower (lower left); and the Continental A-40, 35 horsepower (lower right).
Carburetors, magnetos, starters, generators, spark plugs, piston rings, bearings, cowlings and similar parts were developed by specialists and supplied to the manufacturers of engines.

Some of the outstanding technical developments in this field will be considered in a later chapter, "Out of the Engineering Laboratory." It should be interesting here, however, to obtain a picture of the number of well-established companies—many of them old names in the automotive field—which developed parts or accessories for aircraft during 1930.

The life and efficiency of the spark plug was improved through the researches of the A. C. Spark Plug Company, B. G. Corporation, Champion Spark Plug Company, and Hurley-Townsend Corporation. The Eclipse Aviation Corporation, a division of Bendix Aviation Corporation, Leece Neville and Sky Specialties Corporation improved their inertia starters and generator equipment.

The magneto was the center of specialized research and development in the plants of the Scintilla Magneto Company, a division of Bendix Aviation Corporation, and the Splitdorf Electrical Company. Carburetion was the subject of study by the Bendix-Stromberg Carburetor Company, a division of Bendix Aviation Corporation, which made several refinements on its carburetors supplied for aircraft engines.

The Electric Storage Battery Company and Delco Aviation Corporation, the latter a division of Bendix Aviation Corporation, developed a line of starting ignition units, starting vibrators and switches for aircraft engines. The Vellumoid Company specialized in manufacture of gaskets; Buhl Stamping Company developed new cowlings employed on many engines; and the Ex-Cell-O Aircraft and Tool Corporation made various motor parts designed for the particular needs of some of the principal engine manufacturers.

Special bearings for airplane engines have been developed by several manufacturers, including Norma Hoffman Bearings Co.; S. K. F. Industries, Inc.; and Timken Roller Bearings Co. Other prominent manufacturers of engine parts are Thompson Products Co., valves; Wood & Spencer Co., parts; and McQuay-Norris Manufacturing Co., piston rings.

CHAPTER XI

PREENING WINGS OF COMMERCE

Volume of Federal Activity Promoting and Regulating Aviation Increased
—Close Liaison with Industry Maintained—Weather Bureau
Aids—Bureau of Standards—N. A. C. A.

The several branches and divisions of the federal government charged
with the stimulation of civil aeronautics as an aid to domestic and
foreign trade experienced no let-down in their activities, despite the
depressed condition of certain phases of the aviation industry during 1930.
In fact, all reported an unprecedented volume of business to be handled,
often without an increase in personnel or appropriations commensurate
with the task.

Under the leadership of Col. Clarence M. Young, Assistant Secretary
of Commerce for Aeronautics, the Aeronautics Branch of the Department
of Commerce continued to be a major factor in the proper stimulation
and regulation of all phases of aeronautical activity associated with inter­
state commerce. Closely associated with this branch was the work of the
Aeronautics Trade Division of the Bureau of Foreign and Domestic Com­
merce, especially charged with the development of trade information to
aid American business in the expansion of its markets at home and par­
ticularly abroad.

The Aeronautics Branch reported an increase in its total volume of
work during 1930 in excess of 100 per cent. although personnel was in­
creased only 16 per cent. New tasks added during 1930 to the already
long list of routine duties of the branch included: inspection of scheduled
interstate passenger-carrying lines for certificates of authority to operate,
the inspection and testing of parachutes for approved type certificates and
the examination of parachute riggers for license. The work of the branch
was directly concerned with protecting the flying public by insuring air­
worthy aircraft, competent pilots, adequate airways and standard air traffic
rules.

The Aeronautics Branch was created under the provisions of the Air
Commerce Act of 1926, which was passed by Congress as a result of a
request of the aviation industry for regulation and helpful promotion. It
was the first time in the history of modern business that an industry had
requested regulation to aid in the sound stimulation of its undertakings,
and the government pursued a policy of allowing the new industry a wide
measure of self-regulation through its accredited representatives. Close
cooperation with the industry was maintained on all questions of regulation arising, and a constructive liaison was built up between the Aeronautics Branch and the industry’s trade association, the Aeronautical Chamber of Commerce.

Under a new plan, Assistant Secretary Young was assisted during 1930 in carrying out the program of the Aeronautics Branch by three executives, a Director of Air Regulation, a Chief Engineer of the Airways Division, and a Director of Aeronautic Development. Previously, all activities of the branch were coordinated directly under the Assistant Secretary of Commerce for Aeronautics. Under the decentralized plan,

Gilbert G. Budwig became Director of Air Regulation in direct charge of the inspection service, licensing division and engine testing section. Capt. F. C. Hingsburg was Chief Engineer of the Airways Division, responsible for the establishment and maintenance of aids to air navigation throughout the country, and Col. Harry H. Blee was Director of Aeronautic Development, supervising the development of aeronautic publications, the collection of statistics, promotion of airport activity and similar promotional projects on behalf of the industry.

The Airways Division was organized within the Bureau of Lighthouses of the Department of Commerce and, as far as practicable, its work
was carried on through the regular district organizations of this bureau. The 1930 construction program of the division included the lighting of 3,100 miles of airways, all extensively used for night flying. Thirteen airways radio communication stations and 26 radio range beacons were constructed. Automatic telegraph-typewriter circuits for the collection of weather and aircraft movement reports were placed in service on 5,650 miles of airways. At the close of the year, 29 airway engineers, 95 airway mechanics, and 955 keepers, caretakers and attendants were employed in the maintenance of 13,504 miles of lighted airways throughout the country.

FLYING UPSIDE DOWN

The Air Regulation Service endeavored to protect the flying public and the aeronautical industry by eliminating, as far as possible, insufficiently trained pilots and unairworthy aircraft. In inspection service work alone, 90 men, 75 of whom were pilot-aeronautical engineers and 15 factory airplane inspectors, were employed. The rating of pilots for passenger-carrying privileges according to weights and types of aircraft was undertaken to raise the standard of flying ability among pilots and consequently increase the safety of the flying public who ride as passengers. Flying school regulations which became effective in 1929 resulted in the issuing of certificates to 44 approved schools. Development in aircraft design and
performance advanced substantially under critical testing of various models by engineering inspectors. The medical section of the licensing division certified 43,902 physical examinations in 1930 as compared to 28,478 in 1929, and the number of examiners was increased from 704 to 816. In fact, every section experienced a similar increase in the volume of its work. The Aeronautic Development Service undertook a thorough study of hangar fire hazards and airport zoning problems during 1930 in addition to its numerous duties associated with the furnishing of information on all phases of aeronautical development to the general public. A report of the hangar fire hazard investigation was made public near the close of the year, and the special committee on airport zoning was to make its report early in 1931. The Aeronautical Chamber of Commerce was represented on both these committees.

**United States Weather Bureau**

Closely associated with the work of the Airways Division of the Department of Commerce was the indispensable aid to air navigation fur-
READY FOR PLANECHUTE TEST

With a giant parachute tucked into the rear of the fuselage beneath the rudder, the test pilot is seen ready to take off before his experimental drop to earth.

PARACHUTE DROPPING PLANE

Experimental ship is seen descending to the ground after 'chute has been released, demonstrating practicability of new device.
nished by the U. S. Weather Bureau through the collection of weather data at frequent intervals along the principal air routes. During 1930, the Bureau established pilot-balloon service at eight additional stations, making a total of 53 stations of this type. The majority of them were located at airports and furnished frequent information throughout the day and night to collecting centers along the airways. Reports also were received twice daily from 200 first-order weather stations. These, in combination with upper-air reports, were utilized in making aviation forecasts which were transmitted by automatic telegraph-typewriters and radio stations to all pilots flying along the airways.

WEATHER REPORTS FOR PILOTS
Section of the Weather Bureau of Transcontinental and Western Air, Inc., at the new Alhambra Airport, upon which pilots depend for frequent reports.

During 1930, the Weather Bureau established 120 special airways weather report stations in addition to the 110 already in operation. It was found that information as to weather conditions in areas adjacent to an airway was of considerable value in forecasting changes to be expected directly on the airway within two or three hours. For this reason, the Weather Bureau established 60 stations from 150 to 200 miles on either side of the transcontinental airway. Reports were received day and night at three hour intervals by four major collecting centers, and résumé of conditions was sent to all airways radio stations in each sector for simultaneous broadcast.
The Aeronautics Branch of the Department of Commerce also enjoyed the cooperation of the Bureau of Standards on all engineering projects concerned with aircraft instruction which demanded special investigation. Among the many special studies made during the year of interest to the aviation industry were those on methods of reducing noise in aircraft and ways of preventing vapor lock in engines. Recommendations were made for reducing noise in the propeller and engine exhaust and for insulating the cabin against outside noises. A wind tunnel in the Bureau's laboratories made possible aerodynamic studies to learn new methods of increasing the efficiency of airplanes. The results of all investigations were made public through special reports written by experts of the Bureau.

**National Advisory Committee for Aeronautics**

The National Advisory Committee for Aeronautics, with one of the world's most extensive research laboratories at Langley Field, Va., con-
continued to work with the several departments of the federal government and the commercial industry upon fundamental problems of flight. For several years the major problems investigated by the Committee were concerned with safety in flight, improvement of aerodynamic efficiency and improvements in general design and operation. During 1930, the Committee's Fifth Annual Aircraft Engineering Research Conference was held at Langley Field in May to review the work of the past year and outline a new research program for 1931.

The problem of the spin was considered the most important under investigation, and the Committee reported that definite progress had been made in its solution. Completion of a new five foot vertical wind tunnel enabled the engineers to concentrate their efforts on a systematic testing program in conjunction with major projects under way. Many other problems of aerodynamic efficiency and design which could not be investigated adequately in the variable density wind tunnel or the propeller research tunnel were to be handled in the new 30 by 60 foot full-scale wind tunnel nearing completion. The testing of full-scale airplanes under the accurately controlled condition of the new tunnel was expected to increase available information on scale and interference effects, and thus lead to marked improvement in general design.

The increased importance of seaplanes and flying boats led the Committee to design and construct a seaplane towing channel 2,050 feet long with a carriage speed of 40 miles an hour. Other important problems studied during the year included those of structural safety, reduction of drag, stability and control, ice formation, propeller characteristics and boundary layer control. The results of each investigation were made available to the industry through numerous technical reports and notes.*

United States Coast Guard

The Coast Guard, flying thousands of miles with equipment purchased in 1927 to determine the usefulness of aircraft in its service, definitely proved the need for its aviation unit during 1930 and prompted officials to draw up specifications for new equipment to be purchased during 1931. During 1930, Coast Guard aircraft cruised a total of 67,655 miles and searched over an area of 801,067 square miles. Its airplanes were in the air 907.5 hours and more than 3,100 vessels were identified.

On eighteen occasions its planes were called upon to search for lost boats, persons or various kinds of property. Searching the sea for lost fishermen and disabled small boats was becoming an important part of the duty of the Coast Guard airplanes. In the winter months, lost boats in

* Complete list of publications of the National Advisory Committee for Aeronautics with directory of its officers included in Appendix.
the North Atlantic had to be found quickly or the occupants perished from exposure. Airplanes could search over large areas quickly and notify surface craft by radio of the location of the boat.

The airplane reporting system established during 1929 along the Atlantic seaboard was continued to observe and report the passage of all planes on the route. Thousands of planes were reported during the year; no plane using the system became lost and many, due to accident or stress of weather, were assisted by Coast Guard Stations.

Other Governmental Boards

Several governmental boards, formed especially to coordinate the work of various departments and bureaus, continued their important work during the year. The Aeronautical Patents and Design Board, created to inquire into the value and possible use by the government of aeronautical inventions submitted to it, considered several hundred designs passed on to it by the National Advisory Committee for Aeronautics. The Helium Board continued to act as the coordinating and advisory body of the Army, Navy and Bureau of Mines departments interested in the non-inflammable lifting gas used in lighter-than-air craft. Actual control and production of helium remained in the hands of the Bureau of Mines, which maintained a huge plant at Amarillo, Tex. Duplication of effort in the Army Air Corps and Navy Bureau of Aeronautics came under the scrutiny of the Aeronautical Board, which continued to act as an important coordinating agency between these bodies. The Board of Surveys and Maps similarly brought together the efforts of all activities in the government concerned with the development of maps. The boards were of great service in the elimination of unnecessary expense resulting from duplication of effort.
SECOND LARGEST IN NATION

Exceeded in size only by Cleveland Municipal Airport, the Oakland Municipal Airport offers land and water terminal facilities.

NEW AIRPORT WAITING ROOM

Rivaling the finest railroad terminals, the new waiting room of the Fairfax Airport at Kansas City, Kan., was completed during 1930.
CHAPTER XII

AIR TERMINALS ON LAND AND SEA


Just as the railroads and steamship lines have a major share of their investments in suitable terminals, so aviation centered much of its attention during the past year on the development of suitable airports and seaplane bases. More than $35,000,000 were expended during 1930 in the expansion and improvement of existing airports or in the establishment of new ones. Construction programs for 1931 called for the further expenditure of at least $20,000,000, according to statistical estimates computed by the Aeronautical Chamber of Commerce from reports of more than 100 typical airports.

The Department of Commerce lists 1,655 ports including auxiliary and intermediate fields. There are at least 750 of these ranking as air terminals. The Aeronautical Chamber of Commerce has prepared a list of 753 of the leading ports with detailed information on the facilities available at each. This tabulated list, which does not include intermediate, auxiliary or poorly conditioned ports, is in the Appendix. It provides a striking picture of the advances which have been made in the provision of suitable terminal facilities for air transport lines and adequate bases from which the aerial service operator or private pilot may fly. The Department of Commerce estimated from a survey made late in 1930 that the total investment in airports and landing facilities in the United States was at least $200,000,000.

The Airport survey made by the Aeronautical Chamber of Commerce for “The Aircraft Year Book” showed that 4,961,950 landings were made on the 753 principal ports during 1930. The safety record of the 101 airports reporting was very good. The number of airplane landings per accident, including even the most minor injury to equipment, was 25,577. The number of landings per person killed, including accidents to student fliers and resulting from acrobatics, was 413,485.

More Than 5,000,000 Passengers

The survey showed that 1,475,348 passengers on scheduled transport lines took off during 1930 from the 753 airports taken into the compu-
tations, and that 3,779,099 other passengers took off on charter flights or for short pleasure hops. The total cost of maintenance of the 753 airports was estimated at $7,669,570 on the basis of the reports received. The average expenditure for maintenance was $10,186. The reported maintenance estimates for 1931 totaled $6,021,946, an average of $7,998 for each port. Expenditures for expansion or improvement of these airports in 1930 totaled $35,278,200, an average of $46,853 for each port. The proposed expansion programs for 1931 contemplate expenditure of $22,391,767, an average of $29,739 for each airport.

TYPICAL COMMERCIAL AIRPORT

Pal-Waukee Airport at Chicago is the base for dispatching the Chicago Daily News to resort points, and other aerial service operations.

Nearly 30,000 acres were added to existing areas during 1930, and many municipalities and commercial airport owners provided for future expansion and protection against the danger of having their operations curtailed, by buying additional land to provide adequate landing area when needed. Some fields were abandoned during the year because lack of foresight on the part of the constructors resulted in the choosing of inadequate and unsuited sites, many times too far from cities or towns to be of economic value.

Under its program of airway development, the Aeronautics Branch of the Department of Commerce carried out an extensive project during 1930, lighting 3,321 miles of airways, establishing and lighting 56 intermediate
GLENN H. CURTISS AIRPORT

New land and sea air terminal at North Beach in Queens, a short distance from New York City, established by Curtiss-Wright.

SEAPLANE BASE IN MIAMI

Yachts of the air and sea mingle at this Curtiss-Wright marine base in Florida, where seaplanes and amphibians await the winter visitor.
landing fields, and installing and operating 218 standard revolving lights for the guidance of pilots after dark. Five thousand six hundred and fifty miles of airways were equipped with automatic telegraph-typewriter circuits which collect and disseminate weather information to planes in flight at regular intervals both day and night. Two radio range beacons, which guide pilots along the airways by means of radio signals, also were placed in operation and 27 were ready for operation late in 1930 or early in 1931.

SIX MINUTES FROM THE CITY
San Francisco Bay Airdrome at Alameda, Cal., is six minutes from the heart of Oakland (in background) by motor car and six minutes from 'Frisco by air ferry.

Program for 1931

During 1931, 3,000 miles of additional airways will be lighted, 33 additional radio range beacon stations will be established, 2,800 miles of automatic telegraph-typewriter circuits will be placed in operation and 20 radio communication stations will be installed. Upon the completion of these 20 stations, there will be scarcely a square mile of area in the United States where flying is a regular activity that a pilot cannot receive broadcasts of weather information while in flight.

Out of 31,000 miles of airways used regularly by planes in the United States the Department of Commerce had completed the lighting and equipping of about 14,500 miles at the close of 1930. The Department listed 500 municipal airports, 558 commercial airports, 306 intermediate landing
fields, 65 Army airdromes, 14 Naval air stations, 210 marked auxiliary fields, and two fields used by the government. Municipalities and private corporations had reported plans for 1,053 new ports during the year and preparatory studies for many of them had been completed. Airports and landing fields equipped for night flying totaled 583.

**Weather Service Expanded**

The United States Weather Bureau made great advances during 1930 in the execution of its program for providing accurate weather data for pilots at all times. Eight stations having pilot-balloon service were added, making a total of 53. The majority of them were at airports designed to furnish information at frequent intervals during the day and night to collecting centers along the airways. Reports also were received twice daily from more than 200 first-order Weather Bureau stations. These, in combination with upper-air reports, were utilized in making aviation weather forecasts which were transmitted by automatic telegraph-type-writers and radio communication stations to all pilots using the airways.

During the year, the Weather Bureau established 120 special airways weather reporting stations in addition to the 110 stations already in opera-
tion. Information on weather conditions in the areas adjacent to an airway is very valuable in forecasting changes which may be expected on the airway within two or three hours. Because of this, 60 Weather Bureau stations were established from 150 to 200 miles on either side of the main transcontinental airway. Reports were received at three hour intervals day and night from each of these stations and the data is collected at four centers. A résumé of conditions in each area is made and broadcast simultaneously from airway radio stations within the sector. Pilots in the air can in this way keep well informed on weather conditions to be expected ahead.

CAMDEN'S AIRPORT-RECREATION CENTER
Central Airport at Camden, N. J., showing administration building, hangars, miniature golf course and swimming pool open to the public.

The question of state participation in the development of well-equipped airways closely co-ordinated with the federal system received considerable attention during 1930. It was obvious that the federal government could not provide and maintain complicated networks of intrastate airways as well as the principal interstate airways. Therefore, such states as Tennessee, New York, Idaho, Pennsylvania, and Michigan took the lead by appropriating from $50,000 to $150,000 for the establishment of intermediate landing fields on state airways and the provision of other necessary equipment.

The problems of management and maintenance of airports became of paramount consideration as completed airport projects settled down to the
WATCHING WEST COAST MANEUVERS
Thousands crowded the new United Airport at Burbank, Cal., when a squadron of Army pursuit planes passed over the administration building and landed.

UNITED AIRPORT AT BURBANK
Fully equipped for night flying, the new United Airport at Burbank, Cal., is representative of the trend in modern air terminal design.
routine business of providing facilities for commercial aviation. Certainly no single agency did more to aid airport managers, engineers and equipment manufacturers in the solution of these problems than the Airport Section of the Aeronautical Chamber of Commerce.

Through its national convention in Buffalo, May 14-16, and through subsequent surveys and committee studies, the Airport Section acted as a national clearing house for the exchange of information and experience in the fields of airport engineering and airport management. Committees on accounting, hangar construction, surfacing and drainage, servicing and

**TULSA'S BUSY PORT**

Reporting a greater volume of traffic than any other airport in the world during the summer of 1930, Tulsa's Municipal Airport is being expanded rapidly.

storage, lighting, seaplane and amphibian bases, traffic handling, concessions, sales and advertising, and small town landing fields worked throughout the year on the specific problems in their field and submitted reports at the national convention in Buffalo which represented the results of their researches. The reports were published with the minutes of the convention and distributed by the Aeronautical Chamber of Commerce to municipalities, corporations or individuals concerned with the development of American airports.

Whether the airport should be expected to show a profit was a problem facing many airport officials. Certainly in the case of commercial
NEW BUILDINGS FOR ROOSEVELT

Scene of many an historic Atlantic flight, Roosevelt Field is expanding rapidly to keep pace with the needs of increased traffic.

LOUNGE IN AIRPORT HOTEL

New Airport Hotel at Roosevelt Field, Mineola, L. I., completed during the year, is equipped with a comfortable lounge, writing room and restaurant.
airports they must show a profit or be justified through the success of operations from them. However, it was becoming the consensus of opinion that municipal airports should not be expected to show a profit any more than a public park or other recreational facility. The returns were in the form of more intangible results associated with the building of an attractive community which would induce individuals and industries to locate within its jurisdiction.

Reports made to the Aeronautical Chamber of Commerce at the end of the first six months of 1930 by 122 American airports showed that 26 per cent. of them were showing a profit, 39 per cent. reported a loss and 35 per cent. failed to answer the question. That airports are becoming increasingly important as general recreation centers for fliers and non-fliers alike is confirmed by the fact that between 25,000,000 and 30,000,000 persons visited the 753 principal airports during 1930, as shown from the reports submitted.

**Concessions to Make Ports Pay**

This led to another interesting phase of airport development not directly concerned with aviation, but having an important bearing upon making commercial ports pay. Many airport operators installed miniature golf
AIRPORT IN BOSTON HARBOR

Boston's Municipal Airport at East Boston, Mass., northern terminus of Colonial Air Transport, is being improved rapidly.

LEAVING PORT WASHINGTON RAMP

Giant American Marchetti S-55 flying boat (2 Isotta Fraschinis) sliding down the ramp before taking off for flight.
courses, swimming pools, archery ranges and other recreational facilities adjacent to the airports to attract additional throngs to their ports and to provide pastime for regular visitors. One New York airport project contemplated the erection of an extensive amusement park, dance hall and skating rink adjacent to the airport to provide an additional source of revenue and to capitalize upon the increasing popularity of airports as gathering places for pleasure-bent throngs.

Fairfax Airport at Kansas City, Kan., opened a night club, as elaborately furnished as any on Broadway, in its airport administration build-

CINCINNATIANS DEDICATE AIRPORT
Thousands crowd Lunken Airport at Cincinnati, Ohio, for the ceremonies officially opening the newly completed municipal airport.

ing which was completed during the year. Roosevelt Field on Long Island, Oakland Municipal Airport in California, Minneapolis Municipal Airport in Minnesota, and Montgomery Airport in Alabama were representative of the development in airport hotels with facilities for guests who did not desire to go into the center of the city for the night. Central Airport at Camden, N. J., was typical of those which included swimming pools and miniature golf courses as a part of their recreational plant.

Birmingham, Ala., voted $1,000,000 in 1930 for the acquisition of a park and its development into a 323 acre airport with equipment capable of obtaining an A-1-A rating. Mobile, Ala., voted a bond issue of $75,000 late in the year to light Bates Field and equip it with a concrete loading apron and an administration building.
Another hangar carrying out the general Spanish Mission architectural plan of the port is seen under construction at the right.

Floodlights installed during 1930 at the Curtiss-Steinberg Airport in St. Louis, one of the Curtiss-Wright chain of airports.
Work on the tide-lands reclamation project at Lindbergh Field, San Diego, Cal., was pushed during 1930 so that the port will be open for general use early in 1931. Los Angeles Municipal Airport planned the erection of additional hangars and an elaborate administration building in 1931 to care for a steady increase in traffic. The San Francisco Bay Airport, at Alameda, Cal., six minutes from San Francisco by air ferry and six minutes from Oakland by motor car, was opened in July, 1930, and prepared for handling 10,000 passengers a month in 1931.

United Airport Completed

United Airports of California, Ltd., a division of United Aircraft and Transport Corporation, developed one of the finest airports in the country during 1930 at Burbank, Cal. Completely equipped for night flying, the port had a 234 acre landing area with three bituminal runways each 3,500 feet long, with an elaborately equipped administration building and three steel and concrete hangars. Both American Airways and the Boeing System used the port as their Southern California base.

Chicago Municipal Airport, long one of the great air transport centers of the country, constructed three new hangars and doubled the size of its postoffice building during the year. A $450,000 bond issue was voted to build an administration building and passenger terminal and to enlarge the size of the field. The Pontiac, Mich., Municipal Airport, one of the two A-A-1 airports in the country, added 80 additional acres to its area, erected a new hangar, and planned the treating of its runways and taxi strips during 1931. Minneapolis completed a $65,000 administration and terminal building on its municipal airport. St. Paul's municipal airport stood out as a model for neatness, cleanliness and systematic handling of operations, which might be followed with profit on many other ports.

Lambert Field, the St. Louis municipal airport, added five long runways, increased its available landing area, built three hangars costing from $50,000 to $80,000 each, and developed maintenance buildings and a comfort station during 1930. Plans for 1931 called for the expenditure of an additional $750,000 in improving the port and building a modern passenger terminal. On Ford Airport at Dearborn, Mich., a large hotel was nearing completion.

Roosevelt Field, a property of the Aviation Corporation, at Mineola, L. I., completed the construction of eight new hangars at a cost of one million dollars in addition to the hotel, restaurant and lunch room mentioned earlier. The Akron, Ohio, Municipal Airport made great strides during the year with construction of a mile of storm sewers to provide adequate drainage, the completion of a grading project necessitating the moving of 1,500,000 yards of earth, and the starting of construction on an
administration building to be completed April 1, 1931. The Akron port is the site of the Goodyear-Zeppelin dock, where two giant dirigibles are under construction for the United States Navy.

**Tulsa Leads in Traffic**

Tulsa, Okla., Municipal Airport established a record for operations from a single airport in 1930, handling 175,000 passengers without accident to a person. Three steel and concrete hangars valued at $135,000 each and a mile of concrete taxi strips were completed during the year. Portland, Ore., built two concrete hangars and a stucco administration building on its municipal airport during 1930. About $100,000 were spent for improvements on the Brownsville, Tex., Municipal Airport, which was the overland gateway to Central and South America. Seattle, Wash., completed an $80,000 administration building and depot on Boeing Field. Tacoma, Wash., Field completed installation of lighting equipment and the construction of a new hangar to meet the demands for increased facilities. Fifty-nine acres were added to the Cheyenne, Wyo., Municipal Airport and a lighting program completed.

Curtiss-Wright continued the operation of the largest chain of commercially owned airports in the country. While fill work was continued at Secaucus, N. J., the Bronx, Secaucus, Houston and Louisville projects laid out by Curtiss-Wright were not developed during the year. The San Mateo, Cal., project was partially developed. Well-equipped airports were maintained at Valley Stream, L. I., where three new hangars were completed and four others were under construction; at North Beach, Queens, where land and water landing facilities were afforded; at New Brunswick, N. J., where three hangars were completed; at Caldwell, N. J., where a school field was in operation; at Baltimore, Md., where two hangars were in use; at Pittsburgh, Pa., where a hangar, administration building and gas station were under construction; at Cleveland, O., where one hangar was in use; at Glenview (Chicago), Ill., the scene of the 1930 air races; at Milwaukee, Wis., where lighting facilities were being added; at St. Louis, Mo., where a restaurant, three hangars and a repair base were nearing completion; at Los Angeles, Cal., where a well-equipped port was to add facilities for an aviation country club; and at Alameda, Cal., where nine hangars and an administration building were in use.

**Uniform Methods Studied**

With such projects in widely separated sections of the country under way, naturally many problems of management faced the airport official. The Airport Section of the Aeronautical Chamber of Commerce was called
upon to study existing methods of handling several of these problems with a view toward adopting uniform methods throughout the country.

How best to handle the dispensation of gasoline at airports was a subject of debate among airport officials everywhere, and a study of existing methods was undertaken. Examination of practices on 22 leading municipal and 19 commercial airports showed a decided preference for exclusive sale of fuel by the airport, while some permitted operators or oil companies to sell the gas. Exclusive sale of gasoline by the airport was commended in the preliminary report prepared on the subject, although it was pointed out that air transport operators using the field should be permitted to purchase their gasoline as they saw fit. On very large and busy ports, the system in use at Oakland Municipal Airport where oil companies sell the gasoline was believed a successful method. A unique system in operation at Roosevelt Field through which gasoline was metered by the airport to operators who sold it was commended to the attention of commercial and private airport operators.

Uniform rates and charges also came under consideration during the year. A study of existing methods of scaling hangar and storage charges resulted in the development of a report to be considered for adoption at the next National Airport Convention in Tulsa, Okla., in March, 1931. It
was learned that most ports based their storage charges on wing span, while some used wing area, number of places in plane, weight, horsepower of engine, and similar yardsticks. A uniform system was drawn up based on wing span as the criterium, listing all airplanes in a specific classification to serve as a basis for charges.

Another study resulted in the recommendation that airports use an hourly basis for charges on washing of airplanes instead of less popular methods such as size, class, type, etc. The study indicated that a charge of from $1.25 to $1.50 per hour was equitable, depending upon the airport's location and labor conditions.

NORTHWEST AIRWAYS TERMINAL
Only three minutes from the heart of St. Paul, this municipal airport serves as a base for Northwest Airways, headquarters at left, in the Twin Cities.

A uniform system of accounting for airports, under consideration for nearly two years, was completed during the year and forms printed for distribution to ports desiring to use the standardized system. It was worked out by the Aeronautical Chamber of Commerce with the co-operation of accounting experts.

Seaplane Terminals Developed
While aviation in the United States has been built principally around the land plane, seaplanes and amphibians were coming into greater popularity among sportsmen and air transport operators alike who realized the
exceptional possibilities for landing facilities on the thousands of bays, lakes and navigable rivers throughout the country. Because almost every big city is located on a navigable body of water, use of the seaplane and amphibian for ferry service to downtown areas has great potential possibilities.

There were 36 commercial seaplane terminals available in the United States at the close of 1930, and thousands of open stretches of water suitable for emergency landings or future development as bases. Most of these terminals consisted of anchorages in protected stretches of water with gas and oil available, while many provided a ramp for the use of amphibians and some were equipped with marine hangars and repair service. The complete list with their owners and a key explaining the character of the base is printed in the Appendix.

In San Francisco, Air Ferries, Ltd., developed an excellent terminal at the end of Pier 5, but a few steps from the Ferry Building, which is typical of deep water terminal developments for marine planes. A semicircular floating island ninety-seven and one-half feet in width was anchored off the end of the pier. The deck resembles a large mushroom in shape, its smooth rounded top sloping into the water on a 180 degree arc. The internal construction is on the cantilever principle. Buoyancy is obtained by pontoons with water ballast tanks to control the trim. The float weighs about 100 tons. Passenger waiting rooms, ticket offices, etc., are located on the pier, from which an ordinary gangplank allows access to the float.

The terminal landing arrangements of Gorst Air Transport at Seattle and Bremerton, Wash., are even simpler than those at San Francisco. This company, the first to undertake the operation of an air ferry, has been highly successful due almost entirely to the rapidity with which they handle passengers at terminals. Given downtown docking facilities, short amphibian runs promise to be of tremendous value to coastal cities in speeding up transportation previously dependent upon boat service.

**Airport Equipment Developments**

Experimental laboratories of American industries interested in airports were busy throughout the year developing new appliances, the need for which has become apparent as air traffic has increased. In the field of radio the Western Electric Company, Inc., and the Radiomarine Corporation developed small, compact two-way radio telephone sets for airport use in communicating with itinerant planes. Airport lighting received the attention of the General Electric Company, the American Gas Accumulator Co. which during the year absorbed the B. B. T. Corp. of Philadelphia, the Westinghouse Lamp Co., the Westinghouse Electric & Mfg. Co., Airport Lighting, Inc., Crouse Hinds Co., Pyle National Co., Sperry Gyroscope Company and others. Rainbow Light, Inc., continued its devel-
opment of neon obstruction markers. The Flexlume Corporation of Buff-
falo, New York, collaborating with Westinghouse Electric & Mfg. Com-
pany's engineers developed a new type neon obstruction marker for trans-
mission power lines that promises much in this important field.

Adequate yet simple systems of traffic control received the attention of
Interflash Signal Corp., and Aero Guides, Inc. Rainbow Light, Inc. in-
stalled several newly developed neon wind tees. These tees, manipulated
from the traffic control tower, show green when landings are allowed and
red when no planes are to alight. They combine the wind indicator with
a means of traffic control which seems adequate for present needs.

Aqua Systems, Inc. continued the installation of their flotation system
of gasoline storage and dispensation while Gilbert and Barker Mfg. Com-
pany's equipment appeared on an increasing number of ports. The Fuels
and Lubricants Section of the Aeronautical Chamber of Commerce devel-
oped a Safety Code for handling aviation gasoline under all types of service
conditions.

The Automatic Sprinkler Corporation of America and Walter Kidde &
Co., Inc. played a leading role in the adaptation of fire fighting equipment
to airport hangars. In the spring the Bureau of Standards held a series of
tests in Washington covering the control of hangar fires through the auto-
matic application of water.

Airport buildings and hangar construction were advanced through the
efforts of the Austin Co., H. H. Robertson Co., Detroit Steel Products
Co., National Steel Products Co. and others. The General Cable Co.
installed many thousands of yards of fencing on American ports and con-
tinued to supply a large portion of the electric cable used for airport
boundary and other lights.

During the year an Airport Equipment Manufacturers Division was
organized in the Airport Section of the Aeronautical Chamber of Com-
merce. Under the Chairmanship of R. S. Bishop of the Detroit Steel
Products Co., the Division adopted a statement of purpose which listed as
the goal of the Division's activity: first, establishment of high standards of
ethics; second, cooperative technical research of a common nature; third,
interchange of information with a view to improved service to airports;
fourth, cooperation with airport officials in solving common problems; and
fifth, the control of exhibits and demonstrations of airport equipment in
connection with airport conferences and conventions. Four sub-committees
were set up to carry on research in lighting, fire protection, building con-
struction and operating equipment. These committees were headed by
H. C. Ritchie, C. M. Wood, J. S. Ervin and Curtiss Main respectively.
FLYING TRADE MARK

Airplanes may be Jacks of All Trades, but none serve a more unusual purpose than this "Flying Trade Mark" of the Standard Oil Company of New Jersey.

BASE FOR AERIAL SERVICE

Curtiss-Wright's new airport at Valley Stream, L. I., is an important center for aerial service operations in the New York metropolitan area.
CHAPTER XIII

AIRPLANES: JACKS OF ALL TRADES

Aerial Service Operators Fly Million Hours—Efficiency Increased—Rates Lowered—Transport Pilot Training Increases—Flying Schools Expand—Aerial Surveys Economical—Crop Dusting

FROM joy hops to photography and crop dusting, the aerial service operator has found that the airplane must be a “Jack of all trades” to serve the diversified needs of modern business and industry.

Nearly one hundred million miles were flown and more than two and one-half million passengers were carried during 1930 by aerial service operators whose business activities ranged from short pleasure “hops” and charter flights to crop dusting, aerial advertising, student instruction and solo, demonstration and exhibition flying, photography, mapping and aerial surveys.

The Department of Commerce in 1930 listed 297 operators of flying schools, 300 concerns doing short “hops” and charter business, 177 doing aerial advertising, eight engaged in crop dusting, 103 making aerial photographs and maps, and 146 engaged in exhibition flying. Allowing for duplications in which single operators engaged in more than one line of activity, there were 600 aerial service concerns in the United States according to the 1930 Department of Commerce directory. This was about 25 per cent less than the number of such concerns listed in 1929. Consolidations and the weeding out of poorly organized concerns through a survival-of-the-fittest process accounted for the decrease in the total number.

The annual survey of aerial service operations made by the Aeronautical Chamber of Commerce for “The Aircraft Year Book” provides an interesting picture of the scope of activities in this field. The final survey, consisting of statistical estimates based on reports of 66 typical operators and computed to include all aerial service operators listed by the Department of Commerce, showed that such operators were based at 854 airports, nearly half of which were equipped for night flying, widely scattered throughout the country. The number of operators with bases equipped for night flying, ready to serve individuals or corporations 24 hours a day, doubled during 1930.

The survey also showed that a major share of the airplanes in service are in the hands of aerial service operators. The statistical estimates revealed that 5,324 airplanes were being employed in this field, 4,908 of
which were single-engined land planes, ten twin-engined land planes, 55 tri-motored land planes, 85 seaplanes, 248 single-engined amphibians and 18 twin-engined amphibians.

**Million Hours Flown**

The total volume in hours and miles flown during 1930 was only slightly under the peak figures of 1929, according to the survey’s statistical estimates. A total of 1,128,937 hours were flown during the year in all classes of aerial service operations, which do not include scheduled air transport or private flying. Estimating these flights at an average speed of 85 miles an hour, 95,959,645 miles—nearly 4,000 times the distance around the earth—were flown in 1930 as compared with 104,336,560 miles in 1929. There was a distinct falling off of business in the short “hop” field, while aerial photography and mapping increased in volume and student instruction held at about the 1929 level.

Student solo accounted for 438,363 hours in the air; student instruction, 310,714 hours; short hops, 148,106 hours; charter flights, 112,127 hours; photography, 8,527 hours; mapping, 6,953 hours; dusting, 3,267 hours; and miscellaneous, 100,880 hours. The number of passengers carried by aerial
service operators in 1930 totaled 2,621,769 as compared with 2,995,530 in 1929.

One of the most interesting results of the survey showed that while the number of passengers carried and miles flown in 1930 were only slightly under 1929, the number of pilots and other personnel employed decreased considerably as the operators tightened up the efficiency of their organizations. The number of pilots employed, for instance, was reduced from 3,658 in 1929 to 2,114 in 1930. The number of hours flown by each pilot, however, was almost doubled; 534 hours per pilot in 1930 as compared with 293 hours in 1929. The total number of employees, all classes, was 12,283 in 1930 as compared to 20,944 in 1929.

**Charter Rates Lowered**

Consistent with this saving, the majority of operators lowered their rates during 1930. The average charter rate per mile for single-engined land planes in 1930 was 30 cents as compared with 45 cents in 1929. The rate per mile for tri-motored land planes was $1.22 in 1930 as compared with $1.35 in 1929. The charter rates for seaplanes and amphibians advanced slightly in 1930 as operators gained more experience and statistical information on their cost of operation. Seaplanes advanced from 38 to 50 cents a mile, single-engined amphibians from 96 cents to $1.00, and twin-engined amphibians from $1.60 to $2.00.
Rates for short hops reported through the survey averaged $2.46 in 1930 as compared with $3.26 in 1929, although the average duration of such flights was one minute longer in 1930—ten and one-half minutes. The average load was the same both years—2.6 persons.

The equipment used for all types of aerial service operations provided an interesting source of study in the survey. The average carrying capacity of the single-engined land planes used was two to three persons; trimotored land planes, 12 persons; seaplanes, four persons; single-engined amphibians, four persons; and twin-engined amphibians, eight persons.

The number of air cooled engines in use doubled the number of water-cooled motors. In the air cooled class below 100 horsepower there were 457. The largest number were rated between 100 and 200 horsepower, with 2,298 in this class; while there were 1,057 between 200 and 300 horsepower. Three hundred and three air cooled engines above 300 horsepower were in service. In the water-cooled class, 1,729 were rated at 100 horsepower or less, 267 between 100 and 200 horsepower, 65 between 200 and 300 horsepower and 28 at 300 horsepower or more. The total number of engines employed in aerial service work during 1930 was 6,204, of which 4,115 were air cooled and 2,089 were water-cooled.
During 1930, these engines ran up a total of 1,147,560 hours of usefulness. The average engine was in use about 190 hours during the year. It is interesting to compare this figure with the average number of hours each airplane was used during the year: 650 hours for single-engined land planes and 910 hours for tri-motored land planes. Air cooled engines of between 200 and 300 horsepower averaged 315 hours during the year, while those of more than 300 horsepower averaged 286 hours' use. Water-cooled engines between 100 and 200 horsepower averaged the largest number of hours in their class: 292.

**SITE FOR BOULDER DAM**

Fairchild Aerial Surveys, Inc., made this aerial photo of Black Canyon to aid engineers in their work of planning the new dam project.

**Student Training Figures**

The statistical estimates made as a result of the Chamber's survey showed that 6,851 students were given training toward pilots' licenses, 625 receiving instruction and solo toward transport licenses, 2,532 toward limited commercial licenses, and 3,694 toward private licenses. The total number given instruction and solo during 1930 was slightly below that of 1929: 6,968. However, the number trained to transport work was double 1929 and there was a slight increase in the limited commercial to offset a falling off in students in the earlier stages of training for private licenses.

While many of the aerial service operators reporting declared their
business showed an increase in volume of from 10 to 50 per cent, during 1930, there was another group of about the same size who reported a smaller volume during the year. Some reported no change in their gross business from 1929. The total gross receipts from aerial service operations during 1930, not including airplane sales, was estimated between $30,000,000 and $35,000,000.

The Curtiss-Wright Flying Service continued to maintain the largest chain of bases in the aerial service field, operating during 1930 from 32 airports in widely scattered sections of the country. Because of the magnitude of the undertaking by a single organization, the Curtiss-Wright Flying Service reported total operation figures easily exceeding those of any other single operator. It carried 214,559 persons during 1930 as compared with 86,589 in 1929 and flew 86,622 hours during the year. The number of hours flown was divided as follows: 7,551 hours in passenger hops; charter flights, 6,320 hours; photography, 1,470 hours; scheduled
operations, 1,768 hours; dusting, 1,278 hours; student instruction, 22,891 hours; student solo, 39,782 hours; and miscellaneous, 4,559 hours.

The seasonal character of the passenger hopping business is indicated from a study of the monthly reports of the Curtiss-Wright organization, which, in this case, can be considered typical of the experience of aerial service operators. The number of passengers carried rose steadily from January to August and then fell off rapidly. There were 1,995 persons carried in January; 12,083 in April; 33,079 in June; 41,117 in August; 18,158 in October and little more than 2,000 in December.

STRANGE BIRDS FOR NEW GUINEA

Gold mining machinery weighing tons being lowered into one of the Junkers monoplanes, powered with three Pratt and Whitney Hornets, for New Guinea service.

Flying Schools Expand

Curtiss-Wright maintained the largest chain of flying schools in the country and trained 497 transport pilots, 426 limited commercial pilots, and 98 private pilots during the year. Schools were located in Los Angeles, San Francisco, Chicago, Kansas City, Detroit, Valley Stream, L. I., Bridgeport, Conn., Hartford, Conn., Portland, Columbus, Indianapolis, Louisville, Memphis, Atlanta and Buffalo.

The Boeing School of Aeronautics at Oakland, Cal., a subsidiary of United Aircraft and Transport Corporation, swung into its ambitious program for raising the standard of ground and flying school instruction through a carefully prepared curriculum which included a graduate trans-
port pilots' course, known as a "Master Pilots' Course," for the most advanced student.

Parks Air College, Inc., a division of Detroit Aircraft Corporation in East St. Louis, Ill., attracted students from all parts of the country for ground and flight instruction. The school averaged about 150 students in attendance throughout the year, many of whom were housed in a new $60,000 dormitory. Parks was one of the first three schools in the country to receive an approved type rating from the Department of Commerce.*

The Aviation Corporation closed its several flying schools operated as the Universal Aviation Schools, but continued to maintain Roosevelt Avia-

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* Complete list of schools with Approved Ratings in Appendix.
Eight state highway departments used aerial surveys to carry on projects for the extension and maintenance of state road systems. Numerous cities were mapped, forest areas were surveyed for timber cruising, thousands of miles of gas, oil and gasoline pipe line surveys were completed. In fact, aerial surveys were made for various purposes from the Everglades of Florida to the wilderness of Canada. Flood control and mosquito control surveys met with success. Newspapers and large industrial organizations employed specialized aerial surveys in their merchandising campaigns to portray graphically the difference between heavy industrial communities, high, medium and low buying residential districts, and swamp and wooded areas which represent non-buying power. The engineering profession employed aerial surveys to eliminate hill climbing, swamp wading, brush cutting and laborious phases of its field work.

Fairchild Aerial Surveys, Inc., a division of the Aviation Corporation, reported an increase in the total hours flown during 1930 over 1929 and in the size of the areas mapped during the year. While the surveys were made primarily for utility companies, railroads, lumber concerns, and cities, several thousand square miles were mapped for the United States Engineer Corps in connection with flood control projects. The Airview...
Department, which specializes in oblique photography, developed a new focusing camera to take close-up views of other airplanes in the air. Recent additions to their library of oblique photographs have brought the number to more than 60,000 views, which include most of the leading cities throughout the world.

The aerial survey division of Curtiss-Wright Flying Service reported nearly a three-fold increase in the volume of its business during 1930 over 1929. The division showed a profit in 1929 and increased its profit in 1930. Working from 30 bases throughout the country, the division flew 1,000 hours during 1930 in the production of aerial photographs. While numerous phases of photographic production were improved, due to design of cameras, films, chemicals, formulae, and mathematical procedures, the Curtiss-Wright organization claimed its greatest contribution in the establishing of a nationwide production organization through its established bases, making possible economy and efficiency in the execution of field projects. It established one of the largest and most modern aerial survey and engineering departments in New York City and provided an engineering laboratory at Memphis, Tenn., to speed production on mapping projects in the Mississippi valley.

Crop Dusting Continued

Drought, which cut down the rate of propagation of the boll weevil during 1930, decreased the amount of business for aerial service operators in this specialized field during the year. However, Delta Air Service operating from Monroe, La., dusted 30,000 acres in Arkansas, Texas and Louisiana, and Curtiss-Wright Flying Service continued its extensive crop dusting operations in the South, flying 1,278 hours to fulfill their dusting contracts.

The Department of Agriculture through its crop dusting investigation unit under Dr. B. R. Coad at Tallulah, La., continued its investigation of improved methods for crop dusting and possible new fields for the employment of planes to rid crops of pests. Nearly two score crop pests have been fought by dusting as a result of these investigations. Dr. Coad made an aerial survey trip into Mexico during the year to continue researches into the habits and movements of pink bollworm, the world's most extensive cotton pest.
CHAPTER XIV

AVIATION IN SCHOOL AND COLLEGE

Kindergarten to University Consider Aviation—Seventy-four Colleges Offer Courses—Thirty-five Hundred Students Enrolled—Elementary and Secondary Education—Newspapers—Radio—Aircraft Shows

Aeronautical education commanded the attention of educators during 1930 from the kindergarten to the graduate school of engineering and economics. While every branch of this broad field was expanded during the year, there was a very well-defined movement among educational experts to study and carefully balance the amount of aeronautical training which should be included in any curriculum.

It was considered important by the industry and educational institutions alike that aviation, and particularly air transportation, should take its place in the program of study along with other great industries and modes of transport, but at the same time every effort should be extended to confine the amount of highly specialized training offered to a relatively few well-equipped universities and vocational schools. This was done to prevent a flood of highly trained graduates pouring into the aircraft industry at a rate faster than the industry could normally absorb them.

In line with this policy, fourteen universities and colleges in widely separated sections of the country offered full four-year courses leading to degrees of Bachelor of Science in Aeronautical Engineering or Bachelor of Science in Air Transportation, and provided graduate courses leading to degrees of Master of Science in Aeronautical Engineering or Doctor of Philosophy. These institutions, almost invariably, outlined curricula for the student from his freshman year until graduation, providing a thorough engineering training in the first two or three years and specialized work in aeronautics in the junior and senior years.

The University of Alabama, California Institute of Technology, University of Cincinnati, Carnegie Institute of Technology, Georgia School of Technology, Massachusetts Institute of Technology, University of Michigan, University of Minnesota, New York University, University of Pittsburgh, University of Southern California, Stanford University, University of Texas and the University of Washington could be classified in this group of institutions, offering advanced training for specialized aeronautical degrees. They were equipped with wind tunnels, engines, laboratory equipment and qualified professors, many of whom have had actual experi-
ence as designers or engineers in the aircraft industry. Several of them, including New York and Georgia, had special buildings built exclusively for aeronautical laboratories.

Quite a large number of universities and colleges offering aeronautical training included aeronautical engineering as an option in their regular mechanical engineering course leading to a degree of Bachelor of Science in Mechanical Engineering. The University of California, North Carolina State College, University of North Carolina, Oregon State College, Virginia Polytechnic Institute, and Worcester Polytechnic Institute are among those who maintained this policy. In effect, their courses were as extensive as those in the first group, but no specialized degree in aeronautics was given the graduate. At least one institution, the University of South Dakota, included its aeronautics option in the regular civil engineering curriculum.

Wide Scope of Curricula

More than fifty other universities and colleges in the United States offered aeronautical education of some kind, varying from a single course in elementary aerodynamics to a dozen courses including airplane design, aircraft engines, navigation, propellers, airships, airplane performance, air transportation and specialized research. These courses were usually offered
at the student's option in his senior year and occasionally to well-advanced students in their junior years.

Universities and colleges offering some kind of aeronautical education, but not designed to fulfill the requirements for a degree in aeronautical engineering or air transportation economics, included: Alabama Polytechnic Institute, University of Arizona, University of Arkansas, Armour Institute of Technology, Bradley Polytechnic Institute, University of Buffalo, Catholic University of America, Clarkson College of Technology, Colorado College, Connecticut Agricultural Colleges, Cornell University, College of City of De-

AERONAUTICAL ENGINEERING STUDENTS

Working on aircraft design problems, students at Worcester Polytechnic Institute in Worcester, Mass., are seen in their study.

droit, University of Detroit, University of Florida, University of Idaho, University of Illinois, Iowa State College, Kansas State Agricultural College, University of Kansas, Lake Forest College, Lehigh University, Marquette University, University of Miami, Montana State College, Morningside College, University of Nebraska, University of Nevada, University of New Hampshire, New Mexico College of Agriculture and Mechanical Arts, North Dakota Agricultural College, Ohio State University, Oklahoma Agricultural and Mechanical College, University of Oklahoma, University of Omaha, University of Oregon, Penn State College, University of Pennsylvania, Purdue University, Rensselaer Polytechnic Institute, Rose Polytechnic Institute, Syracuse University, Tulane University, United States Military Academy,
United States Naval Academy, Utah State Agricultural College, University of Utah, Vanderbilt University, University of Virginia, State College of Washington, Washington University (St. Louis), University of Wisconsin, University of Wyoming and Yale University.

The optional aeronautics courses offered by these institutions were designed to give the college graduates, who desired to take graduate work in aeronautical engineering at some other school in the first group, a background necessary for such work. The courses in many cases were of sufficient scope to permit a graduate to immediately enter the industry as an engineer-apprentice, obtaining his practical experience and specialized knowledge first hand.

Syracuse Opens New Course

Syracuse University offered for the first time in 1930 a comprehensive course in aerial photo surveying and mapping, the first such course to be offered in an American university. The equipment for the course and for research into this highly specialized field was provided through a grant of $60,000 by the Daniel Guggenheim Fund for the Promotion of Aeronautics.

More than a dozen colleges reporting indicated that they had introduced ground school courses for students desiring to fulfill the Department of Commerce requirements incident to taking flight training at a commercial flying school. Several of them had made arrangements with commercial schools to give their students flight training following the ground school course. More than a score of the institutions reporting had glider or flying clubs operating or in process of organization. Nineteen indicated that flight training was available for students at nearby airports, and twenty-two reported the faculty's attitude to be favorable to students taking such training while in the university. None reported opposition, although many, evidently without any definite policy, did not answer the question asked in the Aeronautical Chamber of Commerce survey.

Seventy-four universities and colleges in the United States were offering courses in aeronautics of some kind during 1930-31. This was thirteen more than the total number reporting such courses in 1929, and some nineteen new ones were on the list for 1930-31. Birmingham-Southern College, University of Akron and University of Delaware reported discontinuance of their courses, and three other institutions, Temple, Oklahoma City, and Union, failed to report in 1930.

Enrollments Total 3,593

The popularity of these courses and the number of faculty members required to teach them can be learned at a glance from the tabulated list
STANFORD'S DYNAMOMETER LAB
A three foot model propeller is mounted for test on the dynamometer of the Guggenheim Aeronautic Laboratory at Stanford University.

WATCHING FLOW PATTERNS
With powdered aluminum dusted over its surface, the water channel in the Guggenheim Laboratory of Stanford University makes it possible to visualize flow patterns.
of universities and colleges offering aeronautic courses, as compiled by the Aeronautical Chamber of Commerce and published in the Appendix. The reports showed that 3,593 students were enrolled in the seventy-four institutions during 1930-31, and that sixty-three full time instructors and two hundred and fifteen part time instructors were engaged in teaching these specialized subjects. This can be compared with a total enrollment of 2,406 students in sixty-one universities and colleges, employing forty full time and one hundred and fifty part time instructors, in 1929. Many of the colleges reported that they are extending every effort to keep the number of students enrolled in their aeronautic courses to the minimum, so that students would not expect to find numerous lucrative positions upon graduation only to be disappointed because the field was overcrowded.

The problems concerned with the several phases of aeronautical education prompted the Educational Committee of the Aeronautical Chamber of Commerce to call a National Conference on Aeronautical Education during the International Aircraft Exposition in St. Louis, February 17, 18 and 19, 1930, in cooperation with the Daniel Guggenheim Fund Committee on Elementary and Secondary Aeronautical Education. In order to make possible the maximum amount of achievement during the conference, the Educational Committee devised a working plan to permit delegates to get at the heart of their problems quickly. The opening session was devoted to a presentation of addresses designed to provide a comprehensive picture of what had been done in each of the several fields of aeronautical education. The next three sessions were given over to the deliberations of three committees into which the conference was subdivided: the first, studying aeronautical education in universities and colleges; the second, problems of the public schools; and third, aviation ground school instruction. The final reports of these three committees represented a compendium of information of great value to directing the efforts of educators throughout the country. The discussions and reports were printed by the Guggenheim Committee and distributed by the Aeronautical Chamber of Commerce. Success of the conference resulted in plans for a Second National Conference in April, 1931, during the National Aircraft Show in Detroit.

Teachers' Training Courses

The Daniel Guggenheim Fund Committee on Elementary and Secondary Aeronautical Education also continued to carry on its work for the training of aviation ground school teachers in cooperation with the School of Education at New York University, with the emphasis shifting from the training of teachers for commercial schools to the training of teachers in aeronautics for the public schools. The Committee also continued to carry on its research in this field and issued several reports during the
year, one of the most important of which described typical courses of study for aeronautics now being used in the public schools of the country.

The annual meeting of the Advisory Group of the Daniel Guggenheim Fund Committee was held in Atlantic City coincident with the annual convention of the Department of Superintendents of the National Education Association. The Advisory Committee, consisting of about eighty educators in the elementary and secondary school field, expressed its appreciation of the work done by the Executive Committee and voted to continue the activities of the Committee with particular emphasis upon the training of teachers, and the preparation of courses of study and textbooks for the instruction of aviation in the public schools.

The work with the elementary and secondary, trade, and continuation schools in the country was continued by the Guggenheim Committee with some interesting results. The number of schools giving aeronautical work of some kind increased to five hundred. The trend of education of airplane mechanics and airplane engine mechanics, and in the subjects generally included in ground school work, appeared to be from the private commercial schools to the public schools. In several localities, private schools have discontinued this type of instruction and have concentrated their efforts on flying instruction, while the ground and mechanical training has been taken over in a large measure by the public schools.

Trend toward Public Schools

If this trend continues, and there seems to be every indication that it will, training in aviation will follow the trends of early automobile education, which has now passed almost entirely into the public schools so far as training for mechanics is concerned. The National Recreation Congress, at its conference in Atlantic City in October, decided to abandon the national model contest which it had been staging annually. It was reported that this action was taken because it was felt that the public schools were now able to sponsor this work and were willing to do so without stimulus of a model contest.

The Guggenheim Committee reported that in two-thirds of the school systems of the country the child's interest in aviation is being used to stimulate his interest in the more prosaic school subjects in the curriculum. For this reason, aviation in some way entered the daily school lives of millions of children from the kindergarten through the high school.

Every agency concerned with the education of mankind was in some way influencing the attitude of the public toward aviation, remodeling old, preconceived ideas and better informing the masses as to the facts of aviation. Newspapers, magazines, motion, pictures, radio broadcasts, libraries, advertising and art were among the media through which the public was
learning more about aviation. More than 200 major newspapers had qualified aviation editors writing on some new development in aviation, while the "spot" news of aviation's progress was given a prominent place in every paper in the country. The air transport lines developed new motion pictures taken along their lines to educate the public and theatre distributing agencies cooperated in the projection of them before the theatre-going public. "Flying with Lindbergh", a seven-reel motion picture film presented to the Aeronautical Chamber of Commerce by the Motion Picture Producers of America, was used in an extensive educational campaign being shown before scores of civic and business organizations.

Radio Broadcasts Reach Millions

Aviation programs sponsored by the National Broadcasting Company in 1930 aimed to accomplish three specific things: first, to allay certain fears coincident with aviation, especially parachute jumping; second, to create a larger national interest by giving national network coverage to outstanding events; and third, to encourage the younger generation to enter aviation. Network coverages were given the arrival of the Bermuda fliers, Yancey, Alexander and Bouck, April 10; the Graf Zeppelin on its four-
continent flight in May; the German Atlantic fliers; the French fliers, Coste and Bellonte; the Hunter Brothers record endurance flight; Kingsford-Smith's flight from Ireland to New York and England to Australia; Capt. Hawks' transcontinental flights; the R-100 arrival in Canada; the National Air Races and the New York Aircraft Salon of the Aeronautical Chamber of Commerce. A weekly 15 minute talk of interest to boys was instituted in September as an NBC feature.

The Columbia Broadcasting Company covered the principal aviation

events of the year, including the National Air Races in Chicago, the arrival of Coste and Bellonte, the return of Byrd from the Antarctic, and the arrival of Kingsford-Smith. Short wave transmission from airplanes was used on special broadcasts from a blimp during the America's Cup Yacht Races, and a regular feature, Musical Aviators, was put on the air.

Libraries and Aircraft Shows

Both public and private libraries recognized the importance of collecting information on aeronautics, and many of them set aside special sections for these works. The Library of Congress through its Division of
Aeronautics, set up by a grant from the Guggenheim Fund, purchased several important collections during 1930 and brought the total number of volumes and pamphlets on aeronautics in its possession up to 9,327. The Gaston Tissandier collection, Hermann Hoernes collection, Victor Silberer collection and Maggs Brothers collection were purchased in England and brought to the United States in the Spring. Every effort was being made to build up the Library of Congress collections to be the largest in the world open to the public. The Langley collection in Smith-

N. Y. U. ENGINE LABORATORY
Students testing a new engine in the air cooled engine laboratory of the Guggenheim School at New York University

sonian Institution was turned over to the Library of Congress. The Aeronautics Branch of the Department of Commerce, U. S. Army Air Corps, and National Advisory Committee for Aeronautics contributed some volumes from their collections.

The Aeronautical Chamber of Commerce Library in New York was used extensively by newspaper and magazine writers and others interested in aviation, although it was established originally as a private collection for the use of members in the aircraft industry. The Library was considered the largest devoted exclusively to aeronautics in the United States. It includes more than 1,200 bound volumes as well as 62,000 pamphlets, catalogues, reports and other unbound material.
Twenty-four issues of the Library Bulletin prepared by the Aeronautical Chamber of Commerce librarian were sent to members during the year, indexing more than 5,000 aviation articles printed during the year in domestic and foreign periodicals. Every known domestic and foreign periodical on aeronautics was kept on file in the Chamber's library. The Library Bulletin was used for reference by numerous public libraries, colleges, universities, and clubs as well as members of the Chamber.

The Aeronautical Chamber of Commerce sponsored or sanctioned air-

![New York Aircraft Salon](image)

**NEW YORK AIRCRAFT SALON**

Glimpse of the Transport Arena, containing six giant transport ships, at the greatest aeronautical exhibition ever seen by New Yorkers.

craft shows in several sections of the country to aid in the educating of millions of people who represent the potential aviation market. The International Aircraft Exposition was staged in St. Louis, while the Third All-American Aircraft Show was sanctioned in Detroit and the Chamber staged the New York Aircraft Salon in Madison Square Garden. Smaller shows were sanctioned in Buffalo, Pittsburgh, Cincinnati, Oakland and Camden, N. J. The Chamber's show committee adopted a policy for 1931 calling for one Class A show. It was decided to stage it in Detroit in April, 1931, as the National Aircraft Show.
A few icicles fail to keep this enthusiastic private flier from preparing his Fairchild 71 (Pratt and Whitney Wasp) for flight in northern Canada.

Lakes beckon sportsmen
Wives scan the skies for hubby and his friends when they are due to arrive at a Minnesota Lake camp. It is a Ryan Brougham equipped with pontoons.
CHAPTER XV
WITH THE PRIVATE FLIER

Forty Million Miles Flown—Sportsmen Enter Flying—Industries Use Planes for Wide Range of Tasks—Newspapers and Oil Companies Enthusiastic Plane Owners—Flying Clubs—Gliding

AS GREATER numbers of business executives, professional men and sportsmen became acquainted with the value and joy of flying through increasing use of the air transport lines, interest in private flying heightened. Private ownership of airplanes by individuals or corporations expanded in six years from five to more than 40 per cent of the total number of planes in use. Manufacturers concentrated on developments which they hoped would stimulate this field. They realized that among the requisites to further building up the market are planes that are extremely easy to fly, that are not too expensive, and for which a private pilot's license may be obtained with facility.

Several manufacturers designed and successfully tested small, one and two place, open cockpit planes during 1930 which were to be placed in quantity production in 1931 and offered to the public at from $800 to $1,800. It was this type of plane which was expected to broaden a section of the market among potential private fliers. The manufacturers also made efforts looking toward obtaining private pilot's licenses with less rigid requirements and still maintain a high degree of safety.

Although general acceptance of airplanes for private travel by great masses of people remained to be achieved, there was a host of private fliers throughout the world who were enjoying the exclusiveness of the sky and the opportunities afforded for rapid transportation for pleasure and business. There were plenty of good airplanes—more than a score—offered to the public at prices ranging from $2,000 to $8,000, and many of the privately owned planes were in this class. However, wealthier aviation enthusiasts and big corporations found many of the bigger planes, ranging from $8,000 to $60,000 in price, better suited to their needs or tastes.

Forty Million Miles Flown

These private and industrial owners of aircraft piled up an impressive mileage flown during 1930. It was conservatively estimated that privately owned planes, bent on business or pleasure missions, flew 40,000,000 miles during the year. This did not take into account the mileage flown by
aerial service operators or air transport lines employed by business or in­
dustrial houses to meet their daily needs.*

More than 300 firms were using fleets of privately owned planes in
the development of their business. Thousands of business executives, pro-
fessional men and sportsmen operated their own ships for business or
pleasure. Of the two classes, California had the largest number of private
fliers, New York was second; Illinois, third; Ohio, fourth; and Texas, fifth.

The range of uses to which such craft were put ran the gamut of
business and recreational activities. Gail Borden, dramatic critic for the

AIRPLANE FOR TENDER

Swung on deck of the new million dollar yacht Lotusland owned by Col. E. A.
Deeds, the Sikorsky S-39 Amphibion is used to fly to shore.

Chicago Daily Illustrated News, flew his own plane to “first nights” in
various parts of the country. Dr. Frank A. Brewster of Holdredge, Kan.,
made all of his out-of-town calls with his own plane, covering more terri-
tory in less time than he previously did by motor car and, said he, “saving
money and my nervous system.” Amos Gramlich, young Sarpy County,
Nebraska, farmer, added a plane to the equipment of his 240 acre farm
after learning to fly, because he “found an hour or so in the evening clouds
refreshing after a hard day on the farm.” G. W. Skinner, president of the
Alaska Pacific Salmon Corporation, used his plane for a scouting trip

* These classifications discussed in earlier chapters: “Over the Nation’s Air Lines”
and “Airplanes: Jacks of All Trades”.

to a half dozen of the company's canning properties in Southeastern Alaska, making the round trip from Seattle in four days. The Union Electric Light and Power Company of St. Louis used a radio-equipped tri-motored plane to make surveys and patrol the transmission lines of its system extending over rugged country. Political campaigns in New York and Wisconsin were carried on over a lengthy itinerary by plane.

**Sell Washing Machines by Air**

A Chicago firm engaged in the manufacture of washing and ironing machines began the training of its salesmen as pilots and furnished them with planes, using their most capable men in a larger territory and resulting in a greater volume of business at a less proportionate transportation expense. H. L. Ogg, president of the Automatic Electric Washer Company of Newton, Ia., was authority for the statement that an order for 1,600 machines was taken on a single business trip by air that would not have been possible otherwise.

These were but a few of the industrial uses to which airplanes were being adapted. More than 45 widely different types of businesses, all interested in speedy transportation facilities, were using privately owned
planes. Insurance companies, contractors, attorneys, power interests, express companies, advertising agencies, roofers, department stores, publishing houses, automobile, accessory and tire manufacturers were among them. Newspapers and oil companies represented two of the largest groups of aircraft users, and it might be interesting to examine the experiences of some of the principal ones in the two fields.

Experiences of Oil Industry

Seventy-five airplanes were owned and operated by 45 different oil companies, an independent survey made during 1930 showed. Fifteen new planes were sold in this field during the first three months of the year alone. The Vacuum Oil Company bought a fleet of planes to promote sales in the United States and Canada. The Kendall Refining Company had two Travel Air planes. The Texas Company had four ships, headed by Capt. Frank M. Hawks’ speedy Mystery ship. The Standard Oil Company of California had a tri-motored Ford and a fleet of three Stearmans. The Standard Oil Company of Indiana had three ships used by executives who have flown 105,000 miles in three years, while the planes also were sent on good-will missions to carry 15,051 passengers and fly 1,644 hours. The Utah Oil Refining Company carried more than 6,000 passengers in its
planes. The Phillips Petroleum Company flew 43,000 miles in nine months, testing and demonstrating a new aviation fuel. Money was saved by the Union Oil Company of California by using its planes to send its attorneys to settle legal questions in connection with a tax problem and to expedite the signing of leases. Two of Union's five planes were used by the geological department for air surveys and quick trips to locations. The Continental Oil Company used a plane for a 5,000 mile tour of its division headquarters in the marketing of a new germ-processed motor oil, saving $2,000 over other means of transport by covering the territory in 21 days.

A break in a gas line near Ponca City was permitting gas to escape at the rate of $4,000 per day. Because several feet of snow covered the ground, it was feared that it would take a week to locate the break. A company airplane was pressed into service and the break was discovered in 14 minutes. The Moody-Seagraves Company of Houston, Tex., associated with the oil and natural gas industry, bought a Bellanca Pacemaker to carry executives. The Standard Oil Company of New Jersey, Standard Oil Company of Louisiana, and Standard Oil Company of Ohio operate fleets of planes to transport executives and extend sales promotion work. The Shell Oil Company used airplanes in its various divisions throughout the world.
More than two-score newspapers were using planes to deliver papers to rural routes and summer resorts, carry executives to important meetings, get news photographs of distant events, and transport reporters in quest of "beats". F. F. Garside, owner and publisher of the Tonopah, Nev., Daily Times and Las Vegas Review Journal, made weekly trips between the two papers, 220 miles apart, in his private plane. The New York Times employed fleets of planes in delivering papers during the summer months in upstate New York, Vermont, New Hampshire, Maine and Canadian points, and to Florida during the winter. The Burlington, Ia., Gazette bought an American Eagle to get pictures and stories quickly.

The Chicago Daily News, New York Evening World, Boston Transcript, Boston Evening Record and Morning American, Boston Herald Traveller, and New Orleans Times Picayune reported ownership of planes used in delivering papers to distant points. The Des Moines Register and Tribune limited the use of its planes to coverage of important news stories. The Bloomington, Ill., Daily Pantagraph reported that the cost of using planes for delivery in its section was prohibitive, but that for news coverage of 150 Illinois towns reached by the paper, the plane was indispensable.

The Waterbury, Conn., American used a plane to deliver papers to its suburban subscribers and claimed the method to be practical. Josiah
P. Rowe, Jr., publisher of the Fredericksburg, Va., Daily Free Lance Star, piloted his own plane on business and pleasure jaunts. The Cleveland News purchased a Sikorsky amphibian, its second plane, during the year. The Ogden, Utah, Standard Examiner overcame the handicap of a flood and landslide by delivering its papers to subscribers by airplane. The subscribers received their papers even earlier than usual. The Rochester Times-Union participated in the New York State Air Tour. The McCook, Nebr., Daily Gazette discontinued its airplane delivery service after a nine months' trial with the admission that it was too expensive. The publisher said the paper had gained in circulation and lineage, however, and that he believed a better adapted plane would be practical. The Chicago Tribune's flying yacht, 'Arf Pint, made a cruise during the year with its aviation editor aboard.

**NEWSPAPER OWNS THIS ONE**

The Chicago Daily News accepted delivery on its "Blue Streak," a Bellanca tandem sesquiplane (2 Pratt and Whitney Wasps), designed for long distance flights.

Haul Gold Mining Machinery

Perhaps one of the most unique uses of industrially owned airplanes during 1931 will be in far-off British New Guinea, the world's second largest and unexplored island. Three monoplanes, powered with nine Pratt and Whitney Hornet engines, were preparing for the Herculean task of transporting heavy gold dredging machinery 60 miles into the interior.
of the strange island, where roads are only trails through the wilderness and water transportation is impossible because of treacherous rapids and swirling whirlpools. It will be a strange sight for the pygmies and cannibalistic savages who inhabit the island when the mechanical birds carry 3,000 tons of gold mining machinery into the interior. The heaviest single piece of machinery weighs 7,000 pounds. The specially stressed planes can make the trip in 40 minutes over a route which requires eight days of treacherous travel through jungle swamps and over rugged mountains on mule back. Five emergency landing fields were established along the 60 mile route to insure safety of operations.

![Image of airplanes](image-url)

**PLANES FOR EXECUTIVE USE**

Sikorsky amphibian (2 Pratt and Whitney Wasps) and Ford tri-motor (3 Pratt and Whitney Wasps) used by executives of Pratt and Whitney.

In the field of the individual owner, scores of new sportsmen, lured by the thoughts of rapid transportation to favorite fishing or hunting haunts or to distant sport events, joined the ranks of hundreds of private fliers who fly for just the sport of the thing.

**Amphibian as Yacht Tender**

The new million-dollar Diesel yacht Lotosland, built for Col. Edward A. Deeds, vice-president of the National City Bank, introduced a combined yacht-airplane service to private boat owners. A Sikorsky S-39 (Pratt and Whitney Wasp) amphibian was added to her equipment. While the
WITH THE PRIVATE FLIER

yacht is 206 feet long and has a 28 foot beam, the plane has a wingspread of 38 feet and extended 10 feet beyond the foredeck. It was loaded on and off the yacht by the special boom attached to the foremast. The plane was a four-place amphibian with a 400 mile flying range for commuting between yacht and shore.

Marshall Field III, grandson of the founder of Marshall Field and Company, Chicago, soloed at Roosevelt Field, N. Y., in July in his own Fleet (Kinner) biplane after 11 hours of instruction. His solo flight was

STANDARD OIL'S FLEET

Three Stearman biplanes (Pratt and Whitney Wasps), part of a large fleet owned by Standard Oil Company of California, in flight over Oakland.

the first intimation to friends that he had added flying to yachting and polo as his sport interests. He owns a Loening amphibian and has a private ramp on his estate on Long Island Sound. Joseph M. Patterson and his daughter, Alicia, used their several private planes constantly throughout the year. L. M. Lombard and F. M. Blodgett, Boston sportsmen, flew to Alaska in August to hunt big game. J. Cheever Cowdin, Jr., son of the polo player, and Carl Bruer soloed at Aviation Country Club after less than ten hours instruction. John D. Hertz and his wife and
daughter, Helen, made a 3,500 mile tour of the Caribbean in their own plane. Col. Charles A. Lindbergh passed his 375,000th mile in the air during the year and Mrs. Lindbergh had flown nearly 50,000 miles, some of it at the controls. There were literally thousands of sportsmen, business and professional men flying their own planes for business or pleasure. Many women flew their own planes, and their numbers have increased so rapidly that their exploits are reviewed in a separate chapter, "Wings for Women."

FLYING TELEPHONE LABORATORY

New aircraft radio equipment is tested by Bell Telephone Laboratories in this Ford tri-motored monoplane powered with Pratt and Whitney Wasps.

Flying Clubs Own Planes

Flying clubs and aviation country clubs were a powerful influence in interesting larger numbers of private pilots to get into the air. Charles L. Lawrance is authority for the statement that there were 304 flying clubs in the United States owning plane equipment of some kind during 1930. Undoubtedly, many were of very loose organization owning but a single plane and renting hangar space at the nearest airport. Fifty per cent of the clubs had sprung into existence during the last 18 months. By organizing in groups, people could afford to buy and maintain an airplane the cost of which might go beyond the means of any one in the group.

Flying clubs had been organized in many colleges and universities, but only the one at Harvard owned and operated its own plane. Several
operated gliders and were training their members in the elementary details of flying. The Harvard Club was awarded the Loening trophy in April for its advancement in this pioneer field. Yale, Cornell, Pennsylvania, New York, Carnegie Tech, University of Detroit, Illinois, Ohio State, Michigan and Southern California were among the institutions with organized flying clubs. Alpha Eta Rho was organized at the University of Southern California as a national collegiate aviation fraternity.

The National Aeronautic Association launched a campaign in 1930 to popularize private flying clubs and acquired a plane for its club secretary to use on trips around the country. The work was started through a grant of the Guggenheim Fund.

The Curtiss-Wright Corporation developed a flying club plan to show the way to individuals who desire to form clubs and obtain well-equipped airplanes at reasonable rates. A booklet describing the plan and giving operating costs for Curtiss-Wright planes adapted to such a plan was widely distributed.
Perhaps the most elaborate club plan yet devised was in its second successful year of operation at the Aviation Country Club at Hicksville, L. I. The club owned its own field, clubhouse and four planes; maintained an exclusive membership; and provided space for 50 planes privately owned by members of the club. The success of the Long Island club prompted the national organization to speed the development of clubs in Los Angeles, San Francisco, Philadelphia and at Long Ridge, Conn. Financing of the Philadelphia club was completed at a meeting November 20 and construction of the clubhouse and field was started at once, to be completed in 1931. The Westchester club at Long Ridge obtained property for its field and planned construction work in the Spring of 1931. The Long Island club showed a profit for the last six months of 1930 despite reduced rates of $7.50 per hour for solo time and $12.50 per hour for instruction.

**Gliding Gains in Popularity**

Gliding continued to gain in favor among sportsmen who did not mind the labor of taking their turns at the snap cord in launching the gliders on their relatively short flights. Several hundred gliders, most of them of the primary type, were built in the United States during 1930.
and many of them were sold to individuals or clubs. Some enthusiasts claimed that gliding was the logical training for the student flier to take before using powered airplanes. Others felt that the strenuous exercise connected with primary and secondary gliding would keep the number of enthusiasts at a minimum. Nevertheless, the movement was gaining impetus in America as it had previously in Germany, where more than 200,000 persons have participated in the sport. Robert Kronfield of Austria set a new distance record during 1930 when he rode a thunder cloud 101 miles.

NEW THRILL FOR WATER DOGS
Detroit Seagull glider equipped with pontoons being towed at 50 miles an hour by a speed boat over Detroit River, seeking new record.

The world duration record was made in Germany in 1927 by Ferdinand Schultz who stayed aloft 14 hours and seven minutes. The world altitude record for gliders was made in 1929 by Johannes Nehring who climbed 3,940 feet.

During the First National Soaring Contest held by the National Glider Association in September at Elmira, N. Y., Warren Eaton headed his motorless ship into the wind to climb to 2,409 feet, for a new American
record. Ninety-nine qualified soaring flights were made during the contest, 70 of which were for endurance records, lasting more than 30 minutes each. Jack O'Meara kept his slender winged soarer aloft six hours and 48 minutes for an official American record, although Jack Barstow had unofficially placed the American record at 15 hours and 12 minutes earlier in the year. Wallace Backus aided in staging a "refueling" flight during the contest when he took off and fed O'Meara who had been in the air for hours headed for a record. Wallace Franklin, flying one of his own gliders, made a spot landing within three inches of the flag to demonstrate his skill with the motorless craft. Eight first class glider pilot's licenses were earned during the meet by Eaton, Backus, A. P. Artan, Prof. R. E. Franklin, Wallace Franklin, Capt. Frank M. Hawks, C. S. Jones, and Major W. C. Purcell. It is necessary to circle the field from which the glider is launched for five minutes to obtain a first class license.

Col. and Mrs. Charles A. Lindbergh made their first glider flights earlier in the year at San Diego and earned first class licenses. Mrs. Lindbergh stayed aloft six minutes and was the first woman in the United States to earn a first class license. Both said they enjoyed it and thought the possibilities for gliding as a sport were unlimited. Sixty-five glider clubs had been organized and were affiliated with the National Glider Association before the close of 1930.
CHAPTER XVI

WINGS FOR WOMEN

Backseat-Pilots Take the Stick—Woman’s Influence on Plane Luxury—
Color’s Part in Sales—Pilots from All Walks of Life—Exploits
of World’s Best Women Fliers

THE hand that rocked the cradle flies the family’s plane today. No
more content with a place as backseat-pilot than they were with
backseat motoring, women are turning to aviation in increasing num­bers. More than 300 women have qualified as pilots, some of them to enter
the aircraft industry, many of them to enjoy the sport of flying or join
their husbands in piloting the family plane.

The number of women pilots has been more than doubled in the past
year, quadrupled in the past two years. This does not mean, however,
that women have not taken their places alongside men since the birth of
flying. Five years before George Washington became President of the
United States, the first feminine air passenger ascended into the air. She
was Madame Thible, a French woman who ascended in a Montgolfier
balloon from Lyons, France, in 1784, a year after the first authenticated
balloon ascension. Mrs. Hart O. Berg was the first woman to fly in a
heavier-than-air machine, taking off with Wilbur Wright at Le Mans,
France, October 7, 1908. Harriet Quimby of Boston was the first Ameri­
can woman to receive a pilot’s license—1911. The following year she
flew the English channel, the first of her sex to achieve such a feat. How­
ever, there were no more than a dozen women pilots before the World
War.

American women have taken far more interest in aviation than their
sisters abroad in England, France, Germany or Russia, although those coun­
tries boast some outstanding women pilots. In January, 1929, the United
States had only 34 licensed women pilots. In July, 1929, there were 70;
January, 1930, 126; July, 1930, 270; and more than 300 at the end of the
year. Twice this number were registered in flying schools throughout the
country, learning to fly. England has less than half the number of Ameri­
can women pilots.

Just as women were an important force in hastening the motor car
out of the linen-duster stage, so they have influenced the building of luxury
and comfort into the 1931 model planes, ranging from the well-furnished
transport liners to the colorfully painted sport planes. The air lines have
learned that when they use a woman's judgment as the yardstick for decorating and furnishing their planes and passenger terminals, they not only attract other women passengers but overcome wives' and sisters' objections to husbands' and brothers' flying.

An independent survey of the air transport lines made during 1930 indicates that a large percentage of the passengers flying the regular air lines are women. Leaders in the aircraft industry feel that this is an important factor in further building the volume of business. Forty-three per cent of the passengers on Pan American Airways between Miami, Havana and Nassau are women; 35 per cent of those who fly in the special night plane of Boeing Air Transport between San Francisco and Salt Lake are women; 30 per cent of Colonial Air Transport's passengers between New York and Boston are women; and 28 per cent of the commuters between San Francisco and points across the bay, via Air Ferries, are women. Transcontinental and Western Air estimated that 20 per cent of their transcontinental passengers are members of the fair sex.

**Color's Influence on Sales**

Color, which commands a place in the modern home from refrigerator to alarm clock, is taking an increasingly important place in aviation. Again,
women are the direct cause for the movement. When Miss E. A. Samarow of Montreal, Canada’s first woman pilot, came to New York to buy an American sport plane she ordered one with silver wings, yellow struts, blue fuselage, black top decking and a yellow stripe. Violette de Sibour flew around the world with her husband on a vagabond jaunt in a silver and cobalt sport plane; Phoebe Omlie, first woman to hold a transport license, selected a plane in an entrancing shade of scarlet; Mrs. Beryl Hart owns a bronze-winged ship and Amelia Earhart chose a gleaming white to make her high-powered plane distinctive. Robin’s egg blue and silver is a combination which a California woman chose and cream and purple was the color scheme ordered by another woman customer.

Keeping pace with “friend hubby” has taken some women into the air. The list of licensed pilots published by the Aeronautical Chamber of Commerce contained this entry one week: Kenyon, C. W.—Pvt. 9949; Kenyon, T. W.—Trans. 963; also this one: Fenno, J. K.—Trans. 6546; Fenno, S. S.—Pvt. 9920. Brothers? No, husband and wife! The first are known about Boston Airport as Ted and Teddie; the other two fly out of the Providence, R. I., Airport and the “S” stands for Sarah.

Other notable flying couples: the Thadens of Pittsburgh; O’Donnells of California; May and Jim Haizlip of Tulsa; Blanche and Dewey Noyes
of Cleveland; Esther and Earl Vance; Phyllis and Norman Goddard; Frances and Bill Marsalis; Betty Huyler of candy millions and B. Allison Gillies. There will be others when the “better half” of the following couples are officially licensed: Anne and Charles Lindbergh; Mr. and Mrs. Stanley Stanton; Alicia Grant Patten Jordanoff and Assen Jordanoff; and Hazel and Ivan Gates.

A school teacher’s desire to keep abreast of new developments so that she may teach others and, perhaps, enlarge the scope of her own enjoyment has led many “schoolmarm’ into the air. Here are a few of them: Mrs. Laura Harney, general science and mathematics teacher in Washington Junior high school, Mount Vernon, N. Y.; Frances Moore, teacher in Cochran Junior high school, Johnstown, Pa.; Wilma Walsh, Spanish teacher in Belleville, N. Y.; Agnew A. Mills, teacher in New York apprentice school; Retha McCullough, fourth grade teacher in Beaumont, Tex.; Meta Rothholz, mathematics teacher in Erasmus Hall high school, Brooklyn; Jane W. Willis, physical training teacher in Denver; and Helen Irene Hyde, teacher in George Washington high school, Los Angeles.

Debutante to Waitress

Analysis of the list of licensed women pilots or of women students under instruction will show that they come from all walks of life; from waitress to debutante. Miss Loranda Prochnik, daughter of the Minister of Austria who was presented to Washington society during the year, was the first of the “diplomatic daughters” to solo. Mary Lincoln Beckwith, grand-daughter of Abraham Lincoln, bought two planes and began her flying course in Washington. Gladys Normand, sister of the late Mabel Norman, screen actress, started flying in Los Angeles. Martha Candler, daughter of Asa G. Candler, Jr., of Atlanta, “wished” for an airplane as a Commencement present, and was met in Nashville upon her graduation from Ward-Belmont with a four-place cabin plane. She then started her flying course in Atlanta. Alice du Pont of Wilmington, Del., 18-year-old daughter of A. Felix du Pont, won her wings in Boston during the year. Beulah Unruh saved thousands of ten-cent tips while she was a waitress in a New York restaurant to pay for her limited commercial flying course, completed during the year. Mrs. A. M. Kleavland, 56, Alameda, Cal., who was the first member of her family to drive a motor car, decided she would be the first to pilot the family plane.

Some women have taken to the air to get on the stage or into the movies, but Elinor Smith and Laura Ingalls left the stage to get into the air. Both have managed, however, to keep a touch of the spectacular or dramatic in their flying exploits. Miss Smith opened her professional flying career in 1928 by flying under all of the East River bridges and had
her license suspended. Since then she has held the world’s altitude record for women; the women’s endurance record; and with Bobbie Trout, the women’s refueling endurance record. Miss Ingalls went in for barrel rolls and loops in a big way. She completed 714 barrel rolls to better by 297 the mark for men set by Dale Jackson. Then she invaded Charles “Speed” Holman’s province and completed 986 loops, bettering her own record of 636, and being only a few hundred short of Holman’s 1,433. She flew a Moth (Gipsy) biplane across the continent and back in 56 hours and two minutes flying time for a women’s record, taking two weeks to do it.

WOMAN WINS KING’S CUP

Outdistancing scores of her male competitors, Winifred Brown flies an Avro Avian to victory in the King’s Cup race.

Careers in Aviation

Some women take up flying to train for a career in the aircraft industry, and not a few have been successful as aircraft saleswomen, airport hostesses or managers, publicity directors, or personal pilots. Louise Thaden, women’s derby winner in 1929, was in charge of Oakland, Cal., sales for Travel Air planes and during two years sold 25 ships. Ruth Nichols was in the sales department of an aviation corporation. The New York Police Department bought its Savoia Marchetti amphibians from a sales corporation of which Morilla Del Carveth is general manager. Mary Victoria
Wessen had the sales agency for Bellanca, Moth and Stinson in the Springfield, Mass., territory. Mary Von Mach became a saleswoman for the Airplanes Sales Company of Michigan, distributors of Consolidated-Fleet. Lorraine Defren, Madeleine Kelly and Betty Russell were on the Curtiss-Wright sales staff.

Airport manager or "hostess" attracted the services of several. Florence E. Klingensmith completed her limited commercial flying course and became manager of the Fargo, N. D., airport in charge of all flying operations there. Margaret Perry, among the first half dozen women to become transport pilots, leased and managed the Culver City, Cal., airport. Helen Cox acted as hostess at the Curtiss-Wright Valley Stream port. Myrtle M. Brown, sister of Mrs. G. M. Bellanca, wife of the aircraft manufacturer, opened her own flying field at Painters Cross Roads, near Concordville, Pa., named the flying field after herself. Nancy Hopkins turned from her position as hostess at the Roosevelt, L. I., Field to manage sales for Kitty Hawk planes there. When Mary Linda Bradley selected a pilot for her personal plane she chose a woman, Marie C. Graham. Not content with backseat-piloting alone, Mrs. Bradley, 43, also learned to fly. Mrs. Mary L. Moore was manager of Interstate Airways, Hartford, Conn.
WINGS FOR WOMEN

Amelia Earhart, tall, lithe, blonde-haired, the first woman to fly the Atlantic, found time away from her writing for Cosmopolitan magazine and her post as vice-president in charge of public relations for New York, Philadelphia and Washington Airways to set a new world’s speed record for women at 181 miles an hour in her Lockheed (Pratt and Whitney Wasp) Vega. On one lap she averaged 197 miles an hour.

Florence Lowe Barnes bettered Miss Earhart’s record flying a low-winged Travel Air (Wright Whirlwind) Mystery ship over a measured course near Los Angeles, August 6, to average 196.16 miles an hour. Ruth

Alexander of San Diego became the first woman to fly non-stop from Canada to Mexico in September when she flew from Vancouver, B. C., to Agua Caliente, 1,460 miles, in 16 hours despite headwinds most of the way. Alicia Patterson, daughter of Joseph Medill Patterson of Chicago, established a woman’s record between Cleveland and New York when she completed the trip in her Laird biplane in two hours and 49 minutes.

Elinor Smith, 18-year-old girl flier, climbed a Bellanca (Wright Whirlwind) Pacemaker to 27,418 feet in March, 1930, for a new woman’s altitude record. She fainted at the top of the climb to add the dramatic touch so characteristic of her flights, but made a safe landing. Miss Smith’s old endurance record of 26 hours was bettered twice by women in France during the year. Mlle. Lena Bernstein, a Russian trained to fly in France, broke
Miss Smith's record by staying aloft 35 hours and 46 minutes. Later, while Coste and Bellonte were flying from Paris to New York, Mlle. Maryse Bastie, French aviatrix, established a new world record by staying aloft 38 hours, bettering the time of her dark-haired Russian competitor.

Dorothy Hester, 19-year-old Portland, Ore., girl, was anxious to show the world that women can do any aerial acrobatic feat achieved by men. After obtaining only a private pilot's license she completed three out of five attempted outside loops, a feat accomplished previously only by men.

Phoebe Omilie outwitted her men competitors to win the Reliability Trophy in the Second All-Indiana Air Tour.

Winifred Brown, a 26-year-old girl from Manchester, England, rose out of obscurity to win the King's Cup Race for 1930, defeating even the winners of the 1929 Schneider Cup Race and 86 other competitors, many of them men. The Hon. Mrs. Victor Bruce, wife of the youngest son of Lord Aberdare, made a solo flight from England to India in 1930, kept her friends in anxiety while friendly Arabs in Persia aided her. She had engine trouble. Mrs. Keith Miller, another British woman flier, bettered Miss Laura Ingalls' east-west transcontinental speed record by making the trip in 25 hours and 44 minutes, flying time, four hours and 43 minutes under Miss Ingalls' time.
Amy “Johnny” Johnson won the hearts of the world in 1930 when she flew from London to Australia alone in a light sport plane, after deserting the humdrum life of a London office to learn to fly. Hers was the outstanding flight by a woman in 1930 and deserves a place among the “history-making” flights of the year. It is reviewed under that heading in an earlier chapter.

Anne Morrow Lindbergh acted as navigator on her husband’s high altitude transcontinental flight which set a new coast-to-coast record, later broken by Capt. Frank Hawks. Mrs. Lindbergh also showed the way for other women to take up flying by soloing her own Bird (Kinner) biplane and by qualifying for a first class glider pilot’s license.

Ruth Nichols established a new transcontinental speed record for women in December, dashing from Los Angeles to New York in 13 hours and 22 minutes, flying time, in a Lockheed Vega powered with a Pratt and Whitney Wasp engine. She stopped over night, however, in Wichita. Ten days before she bettered Mrs. Keith Miller’s time for the east-west women’s record, making the trip in 16 hours, 59 minutes and 30 seconds, flying time.

The “99” Club

American women pilots also developed their national flying organization during the year, claiming more than half of the licensed women pilots in the membership of the “99” club. The club was organized on a national scale to promote interest in flying among women and win proper recognition for the exploits of women in the air. For the first time, women’s records have come to be officially recognized by the Fédération Aéronautique Internationale.

So the achievements of women were finding their way into the pages of aviation history, and 1931 promised to be a banner year.
Detroit Gull glider being launched from a small hill, a sport gaining in popularity among those who like exercise.

An eight place all-metal sesquiplane, powered with a Pratt and Whitney Wasp engine, introduced by Solar Aircraft Corporation.
CHAPTER XVII
THE LAWMAKER IN AVIATION

Legislatures Face Busy 1931 Sessions—Sixty-one Bills Introduced in
1929–30 Session—Many Airport Enabling Acts—Uniformity in
Licensing Noted—Taxation—Insurance

THE legislator interested in aeronautics faced a busy year as the 1931–
32 sessions of the several state legislatures got into action, with
reports coming from many of the states in general session that
aviation bills of some kind were to be considered.

The work of the 1931–32 sessions was considered of such importance
to the proper development of aviation law that the Secretary of Commerce
called a national conference of the states in December to consider the
subject of aeronautic regulatory laws, and to attempt to attain a measure
of uniformity in the character of the legislation enacted. Earlier in the
fall of 1930, the Chamber of Commerce of the United States with the
co-operation of the Aeronautical Chamber of Commerce held regional avi­
ation conferences in Philadelphia, Boston, Chicago, Minneapolis, Atlanta,
Dallas and Portland, Ore., to enlist the aid of business organizations in
the movement for uniformity in aeronautical legislation.

Although 1929–30 was an “off year” in state legislative activity, only
nine of the 48 states being in general session, enough aviation measures
were considered to indicate the trend of legislation on this subject and
to provide a background of experience for the 1931–32 sessions. While
more than 300 aviation bills were considered in 1929–30,* only 61 such
measures were introduced during the 1929–30 session.†

The bills covered a wide range of subjects, including: establishment,
operation and maintenance of airports; licensing of aircraft and airmen;
lying regulations; regulatory bodies; aviation schools; civil and criminal
liability; taxation; insurance; and miscellaneous matters.

The nine states in general session during 1929–30 considered aviation
bills: Kentucky, Louisiana, Massachusetts, Mississippi, New Jersey, New
York, Rhode Island, South Carolina and Virginia. Of the 14 states called
into special session, three, Louisiana, Tennessee and Texas, considered
aeronautical subjects.

The so-called “Airport Enabling Act” received more legislative atten-

* See “The Aircraft Year Book for 1930”.
† Table showing number of bills introduced, enacted and defeated in Appendix.
tion than any of the other special subjects considered. In six states, Kentucky, Louisiana, Massachusetts, New York, Tennessee and Virginia, laws were enacted authorizing the acquisition of land for airport purposes. Three of these laws embrace fairly general authority: for example, in Kentucky, second and third class cities; in New York, third class villages (authority had previously been granted to towns, counties, cities and villages of the first and second class); and in Virginia, cities and incorporated towns.

The legislation of Louisiana, Massachusetts and Tennessee was more special in character. There were also instances of special legislation in Virginia. In New York and North Carolina, bills for particular airports were defeated, and in Massachusetts bills for a state airport and a public airport in a certain city were referred to the next annual session to be held in 1931.

Inclusive of this legislation, the following states, 37 in number, now have general statutes under which establishment, maintenance and operation of airports by political sub-divisions of the state are authorized: Arizona, Arkansas, California, Connecticut, Florida, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Dakota, Texas, Vermont, Virginia, Washington, West Virginia, Wisconsin and Wyoming.

States having laws providing for the maintenance of an airport by the state itself are: Arizona, Arkansas, California, Colorado, Connecticut, Illinois, Kentucky, Massachusetts, Michigan, New Jersey, New Mexico and Rhode Island.

In Georgia, South Carolina and Tennessee, laws are in force providing for particular airports, and the only states now remaining without any laws pertaining to airports of any type are: Alabama, Delaware, Maine, Mississippi, Nevada and Utah. Of these, only Maine and Utah were in session during 1929-30 (both special sessions) and there were no aeronautical measures introduced before their legislatures. With all of these remaining states, excepting Mississippi, having regular sessions scheduled for 1931, it is quite likely that some action of the character under discussion will be taken by these states during the year.

**Licensing of Aircraft and Airmen**

During the 1929-30 session, Kentucky and South Carolina joined the lengthening list of states which require federal licenses for aircraft and airmen in intrastate flying. Such licenses are required by the federal government for all interstate flying. In addition, Kentucky also required state registration of Kentucky planes and pilots.
New Jersey amended its laws (under which a federal license was required for all aircraft and airmen engaged in commercial flight) so as to provide that aircraft "to be avigated within the state" shall meet with the requirements of the federal government, and to make unlawful the avigation of aircraft within the state without its being registered pursuant to the federal regulations applicable to aircraft in interstate commerce.

The Virginia law, which previously required either a state or federal license for all aircraft and airmen now provides that no civil aircraft (all but those used exclusively in the service of the state and federal governments) may be flown in the state unless licensed both under federal law and in accordance with the regulations of the Virginia Corporation Commission, and that no person may operate an aircraft unless he is licensed by both the federal government and the State Corporation Commission.

In Louisiana, a proposed law providing for federal licenses for all aircraft and airmen passed the House, but received no action in the Senate and therefore failed to pass.

Including legislation enacted during 1929-30, 21 states require federal licenses for all aircraft and airmen: Arizona, California, Delaware, Idaho, Indiana, Iowa, Kentucky, Michigan, Mississippi, Missouri (except solo pleasure flights), Montana, New Mexico, North Dakota (by order Board of Railway Commissioners), Rhode Island, South Carolina, South Dakota, Texas, Vermont, Washington, Wisconsin and Wyoming.

Nine states require federal licenses for all aircraft and airmen in commercial flights: Colorado, Illinois, Nebraska, Nevada (by order Public Service Commission), New Jersey (all aircraft must be registered with federal government), New York, North Carolina, Ohio and West Virginia.

Six states require state or federal licenses for all aircraft and airmen: Maine, Maryland, Minnesota, New Hampshire, Oregon and Virginia (both licenses are required for all airmen and all civil aircraft).

Six states require a state license for all aircraft and airmen: Arkansas, Connecticut, Florida, Kansas, Massachusetts and Pennsylvania. No license laws are in force in Alabama, Georgia, Louisiana, Oklahoma, Tennessee and Utah.

Flying Regulations

Without indulging in a discussion of the various air traffic rules in the several states, it is worthy to note that of the eight states having no air traffic rules previous to the 1929-30 session, New York and Kentucky now have such legislation. In New York, a very comprehensive set of rules is now in force to govern both commercial and non-commercial flying within the state. These rules have no application to aircraft used exclusively in the federal or New York State National Guard service. In Kentucky, the State Air Board is empowered by statute to enforce such air
traffic rules as it shall promulgate to govern the operation of all aircraft within that state.

In New York, three measures having to do with flying regulations were defeated. One bill provided for the insertion of the federal air traffic rules in the state penal law. Another provided for a law “regulating the operation and use of aircraft in the state” and requiring reports of accidents involving aircraft. The third would have required the operator of an aircraft to attain an altitude of 500 feet or more above the airport from which he took off before starting on his flight, except where conditions of weather should require low flying.

The only states now without any air traffic rules are: Alabama, Georgia, Louisiana, Mississippi, Oklahoma and Texas.

**State Regulatory Bodies**

Prior to the 1929-30 legislative sessions, 18 states had no regulatory bodies having to do with state aviation matters. They were: Alabama, Delaware, Georgia, Indiana, Iowa, Louisiana, Mississippi, Missouri, Montana, North Carolina, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, Washington and West Virginia.
In Louisiana, a Concurrent Resolution was adopted establishing a standing joint committee on aeronautics from both the House and Senate. In New York, a previously authorized temporary commission was continued to study the needs of aviation in the state and to install a state system of weather observation service.

In Tennessee, a Division of Aeronautics in the State Department of Highways and Public Works was created, the Commissioner of the Department to serve as head of the division with authority to appoint an advisory board and to prescribe and enforce rules and regulations relating to the use of airports and landing fields. In Mississippi and New Jersey, bills of similar character were defeated.

Schools of Aviation

No legislation was enacted during 1929–30 pertaining to aviation schools. New York was the only state having such measures introduced, and both bills, one providing for the approval and licensing of aviation schools in the state and the other establishing a course of instruction in aviation at Cornell University, were defeated.

Civil and Criminal Liability

None of the states acted favorably on measures pertaining to civil and criminal liability related to aviation. In only one state, New York, were such measures introduced and the two bills failed to pass. One of them provided that the owner, proprietor or lessee of an airport should not be liable to the owner, operator or passengers of an aircraft for injuries to person or property unless those injuries resulted from the negligence of the owner, proprietor or lessee of the airport; and that the owner or operator of an aircraft should not be liable to passengers for personal injuries or property damage unless caused by negligence of the aircraft owner or operator. This bill passed the Senate and Assembly, but was vetoed by the Governor.

The other bill provided for the crime of “involuntary homicide”, where an aircraft used in a culpably negligent manner causes death. The bill was defeated.

Taxation

Taxation measures affecting aviation were introduced in four states during 1929–30. Louisiana was the only state to pass such legislation: a bill authorizing police juries to dedicate taxes for the establishment of airports was defeated in general session, but was again introduced in the September, 1930, special session, where it succeeded in passage.
The unsuccessful measures may be summarized as follows: in Mississippi, a bill allowing dealers in motor fuels an exemption from state tax on gasoline to be used exclusively in aircraft was defeated; in South Carolina, a measure designed to exempt from taxation privately owned property used exclusively for aviation purposes was defeated; and in Virginia, a bill failed which would have imposed a tax of five cents per gallon on all fuel sold for aircraft use at or by any municipally owned or controlled airport, one-half of one per cent of the revenue to go into the state treasury, and the balance to be used for the maintenance of the airport where the fuel was sold.

The trend toward exemption of aircraft fuel from state gasoline taxes, generally used for highways, was increasing in the several states which fail to exempt aircraft fuel from the tax or provide a system of refund. New Jersey, Connecticut and Washington found their method for exempting aircraft fuel satisfactory, and other states considered following their lead. Gas tax legislation failing to provide for exemption or refund of the tax collected on gasoline used in aircraft was obviously unjust, and many states have moved to correct this feature of existing statutes.

The United States District Court for the Western District of Oklahoma handed down a decision August 13, 1930, granting to certain air transport operators a permanent injunction restraining the state of Oklahoma
from collecting excise taxes on gasoline consumed by airplanes in interstate commerce. The decision had considerable effect in guiding other courts and states' attorney generals in similar cases. A Nebraska District Court handed down a similar decision in the application of the Boeing Air Transport for an injunction. The Third District Court of Utah then permanently restrained the state from collecting a tax on gasoline used in interstate aviation. Michigan, through its Attorney General, clarified its law to exempt interstate operators. Similar actions were expected in other states.

The state gas tax situation as it affects aircraft can be determined at a glance from a table in the Appendix, showing the amount of the tax, disposition of receipts, whether applicable to aircraft fuel, and whether an exemption or refund is provided.

Aviation Insurance

With the constantly increasing use of aircraft in the daily life and affairs of the nation, it may be reasonably anticipated that the subject of insurance, as it relates to aviation, will be one of increasing importance not only to the aviation industry but to the public generally.

The subject itself is of such a legal and legislative magnitude that a comprehensive discussion would be inappropriate here. Suffice it to say that it has already been a topic for extensive legislative activity throughout the country.

During the 1929-30 session, New York was the only state which enacted new laws on insurance as it applies to aviation. Two bills were passed: one permitting the writing of insurance against the loss or damage to property resulting from the maintenance and use of aircraft and the breakage of glass in aircraft, and the other amending the insurance law so as to permit the writing of insurance against loss or damage to aircraft or property resulting from the maintenance and use of aircraft.

Proposed measures in Louisiana and Massachusetts failed. In Louisiana, a bill requiring a common carrier by air to carry public liability and property damage insurance and another repealing a law requiring an indemnity bond for aircraft, were defeated. In Massachusetts, a bill requiring the furnishing of adequate surety for the payment of damages resulting from the ownership, operation and control of aircraft was referred to the next (1931) annual session.

Miscellaneous Aviation Bills

Kentucky, Louisiana, Massachusetts, New York and Texas acted favorably upon bills of a miscellaneous character. Nine such bills were defeated in Massachusetts, New York and Rhode Island.
In Massachusetts, an unsuccessful attempt was made to enact a law providing "no enjoyment for any length of time of the privilege of operating any aircraft over the land of other persons shall give a legal right to the continued enjoyment of such easement or raise any presumption of a grant thereof."

In Rhode Island, a bill was defeated which provided penalties for operating aircraft while under the influence of drugs or liquor.

**Use of Inland Waters by Aircraft**

Although not related to the direct action of state legislatures on aviation matters, it is interesting to consider a decision made September 13, by the New Jersey State Board of Commerce and Navigation prohibiting the use by aircraft of any of New Jersey's inland waters. The ruling was made by the Board as an incident to the denial of application for permission to operate a flying boat from Lake Hopatcong, N. J. The Board held that aircraft flying over inland waters "constitute a menace to surface navigation".

The Aeronautical Chamber of Commerce filed a formal protest against this ruling, and was granted a hearing before the Board October 20. Claiming that the ruling was too sweeping and extensive in scope, the Chamber's representative suggested that the ruling be modified to cover
the Lake Hopatcong situation only, leaving decision on other use of inland waters suspended until the occasion should arise for the need of a specific ruling. After hearing all arguments, the Board adopted a resolution modifying its previous ruling so that the use of Lake Hopatcong by aircraft is specifically forbidden and other permits will be considered on their own merits at the time application for them is made.

The Attorney General of Wisconsin wrote an opinion during the year specifically stating that use of Wisconsin’s inland waters by aircraft constituted a “proper use.”

Aeronautics in Congress

Without doubt, the outstanding piece of federal legislation enacted during the year was the McNary-Watres Act, providing for amendment of the Kelly Air Mail Act of 1925 and amendments to further encourage commercial aviation. The bill authorizes the Postmaster General to award contracts for the transportation of air mail by aircraft at fixed rates per mile for definite space.

The McNary-Watres Act* was referred to the Committee on the Post Office and Post Roads, April 16, 1930; reported with an amendment and referred to the Committee of the Whole House on the state of the union, April 17; passed the House as amended, April 21; sent to the Senate Committee on Post Offices and Post Roads, April 22; reported back favorably and placed on the calendar, April 23; passed the Senate, April 24; presented to the President, April 28; and approved April 29. It became Public Law No. 178.

The importance and far reaching effects of the McNary-Watres Act already have been discussed in an earlier chapter. Suffice it to say that it was considered a basic necessity to the sound development of air transport and the commercial aircraft industry, generally.

The second session of the Seventy-First Congress considered little other aeronautical legislation other than routine bills providing appropriations or administrative machinery for the carrying out of the federal government’s business in maintaining the national defense and providing for the promotion of commercial aviation.

Legal and Legislative Research

The Legal and Legislative Research Service undertaken by the Aeronautical Chamber of Commerce in 1929 was continued in 1930 to provide a central clearing house for the collection and dissemination of information on aeronautical legislation and regulation. The work of this agency

* Act printed in full in Appendix.
was responsible for the collection and compilation of the information contained in this chapter.

The special bulletins of the Chamber kept its members abreast of the trends in both national and state legislation, and proved of great value to executives within the industry as well as an interesting study for lawyers, educators and legislators who were among the subscribers.

At a meeting late in 1930, the Chamber’s Legal and Legislative Committee recommended the continuance of this research service in 1931.
CHAPTER XVIII

WORLD AVIATION IN 1930

World Air Routes Exceed 153,000 Miles—United States Leads in Every Phase of Aeronautic Activity—France’s and England’s Exports Greatest—Progress Reviewed in Europe, Asia and Africa

NATIONS throughout the world during 1930 continued to realize the increasingly important part being played by aviation in the economic and political spheres of their existence. With American leadership established in every phase of aeronautic activity, the greatest progress made during the year was witnessed in the Americas, although there were some striking examples of advancement in certain countries of Europe, Asia and Africa.

The development of air transport lines, particularly in the United States, Latin America, France, Russia, Spain, Poland and the Netherlands, accounted for the greatest measure of world progress in aviation during the year. Other important nations, notably Germany, Great Britain and Italy, proceeded with a normal development of their air transport services without any spectacular increases in the total mileage of their routes flown.

The total length of air transport routes regularly flown throughout the world at the close of 1930 reached 153,000 miles, representing an increase of about 22 per cent over 1929. Routes flown regularly under the flags of all European nations totaled 72,000 miles, while routes flown under the American flag alone totaled more than 49,500 miles. Latin American routes, including those flown under American and European flags, totaled 38,000 miles. Russia, China, Japan, Siam and South Africa had routes regularly flown totaling 21,000 miles. Australia had an additional 9,000 miles of air routes, and Canada had 7,000 miles including about 1,000 miles flown by ships carrying the American flag.

The United States air transport companies flew about three times as many miles daily as the next nearest nation, Germany, and carried almost three times as many passengers, mail and express. The United States also had more than twice the total mileage of air routes regularly flown by the next nearest nation, France, and while most of the American lines were flown daily, many of the French routes were used only weekly or biweekly.

Aircraft manufacturing throughout the world showed a general decrease in production, according to the best information available, although some of the smaller countries of Europe, whose factories catered principally
to supplying domestic air lines, held their production at 1929 levels. Although production of aircraft in the United States during 1930 was less than half that of 1929, America produced far more airplanes during the year than any other nation.

France and Italy concentrated a great deal of attention upon the development of seaplanes during 1930, not to be outdone by Germany, which had specialized in the construction of large, powerful seaplanes and flying boats. France and England devoted considerable attention to the problem of increased speeds in airplanes and made some important progress during the year in this field. Research and experimental work was reported proceeding at a normal pace, despite the depressed condition of the manufacturing industry in most parts of the world. This was expected to have an important effect upon progress in future years.

Although the domestic aircraft market was depressed during 1930, American manufacturers seeking new trade outlets experienced less than a five per cent. decrease in their exports to foreign countries.* France and England held their volume of aeronautical exports at approximately the 1929 levels, aided by important military construction business from colonial possessions and countries in which they exerted a strong political influence. France and England continued to lead the United States in the volume of aeronautical exports, chiefly because of their important colonial markets, most of which were closed to the United States.

The light airplane club movement, particularly in the British Empire, continued to gain impetus throughout the year and proved a stimulus to the development of private flying in the countries where flying clubs were established. However, no nation had nearly the volume of private and industrial flying which existed in the United States. Canada probably stood second to the United States in this field. The nations of Europe had little or no private or industrial flying.

There was steady progress throughout the year in the linking of nations through treaties and laws affecting aviation, although there was no outstanding document signed during 1930. The chief advances were made in minor revisions and amendments to existing regulations and agreements. Mexico, Japan and several Central American countries promulgated air regulations for the first time. The First International Safety Congress held in France during the fall was expected to prove an important step toward concentrating upon this problem the genius of more than two score nations represented.

As has been seen in an earlier chapter, lighter-than-air development came into a more prominent position during the year with the announcement of plans for extensive world airship services. The United States was

* Complete table of American exports in Appendix.
AIRWAYS IN EUROPE 1930

1. Austrian
2. Belgian
3. Czechoslovak
4. Danish
5. Finnish
6. French
7. German
8. British
9. Hungarian
10. Italian
11. Dutch
12. Polish
13. Rumanian
14. Spanish
15. Swiss
16. Yugoslav
17. Austrian-German
18. Austrian-Czechoslovak-German
19. Austrian-Italian
20. Austrian-Yugoslav-French
21. Danish-German
22. Danish-French-German
23. Dutch-German
24. French-German
25. Italian-German
26. Russian-German
27. Swiss-German
28. Dutch-Swedish
29. Finnish-Swedish
30. Dutch-Swiss
31. Spanish-French
32. Swiss-Czechoslovak
WORLD AVIATION IN 1930

fast assuming leadership in this field with the construction of the world’s largest dirigible under way in Akron.

The strides made in the development of Latin American aviation during the year by American and foreign capital already has been reviewed in an earlier chapter. It might be interesting now to turn the spotlight upon the activities of two score other nations in Europe, Asia, Africa and Australia which had some kind of aeronautical service within their borders during 1930. The countries are listed alphabetically for convenience in future reference.

Australia

Endowed with naturally favorable conditions for flying and inspired by the exploits of their national flying hero—Wing Commander Charles Kingsford-Smith—Australians showed an increased interest in commercial and private aviation during 1930. The light airplane clubs, popular for several years under a plan of government aid, received added stimulus during the year as new candidates applied for instruction. The air lines, too, experienced heavier traffic than in any preceding year.

Western Australian Airways, Ltd., granted an annual subsidy of £25,000 per year from the government, operated weekly service during 1930 from Perth to Derby, 1,467 miles. The Australian National Airways, Ltd., inaugurated service June 1, 1930, from Melbourne to Sydney, using Fokker tri-motored monoplanes of English manufacture. The Queensland and Northern Territory Aerial Service, Ltd. ("Qantas") operated from Brisbane to Camooweal, 1,269 miles, and from Cloncurry to Normanton, 215 miles, receiving a subsidy of £17,000 per year from the government. The Larkin Aircraft and Supply Company, receiving £29,500 annually from the government, maintained weekly service from Adelaide to Cootamundra, 578 miles; from Miludra to Broken Hill, 189 miles; from Melbourne to Hay, 233 miles; and from Camooweal to Daly Waters, 475 miles. Several less important companies maintained taxi and aerial survey services.

The manufacture of aircraft in Australia was confined principally to the De Havilland Company, which operated an assembly plant at Sydney. The Larkin Aircraft Supply Company continued experiments with its six place closed monoplane, Lasconder, built and flown in 1929. No engines were manufactured in Australia, all being imported from England.

There were more than 80 airports in the country and 100 emergency landing fields. There were six aero clubs in operation during the year, the most active being the Aero Clubs of New South Wales, which had a membership of more than 1,000 and had a long waiting list of candidates for instruction. The government paid these clubs £20 for each student trained as a pilot if equipment used was loaned by the government, and £50 if the club owned its own equipment.
The Royal Australian Air Force was nominally maintained independent of the British Royal Air Force though exchanges of personnel were frequently made. The force had about three score planes of all types in service during 1930. Equipment used was purchased largely at the direction of the Air Ministry of England and was entirely of British or Australian manufacture.

There were 212 registered civil planes in Australia early in 1930, 17 of which were American. Pratt and Whitney Hornet engines were shipped to New Guinea during the year to power three tri-motored Junkers monoplanes to be used in transporting heavy gold mining machinery into the interior of the strange island.

Austria

Austria, situated in the heart of Europe, had air lines radiating from its capital to the principal neighboring countries like the spokes of a wheel. Aided by government subsidy amounting to 1,750,000 Austrian schillings (about $240,000) in 1929 and approximately the same amount in 1930, the Oesterreichische Luftverkehrs A. G. (Austrian Air Transport Company) cooperated with air transport companies of other nations to expand its service. During the year ending June 30, 1930, 1,983,289 kilometers* were flown, 21,273 passengers were carried, and 829,014 kilograms† of mail, express and luggage were transported without a single fatal accident.

Four air transport lines were operated into this Alpine country throughout the year, while 13 other services were offered during the summer months. The Oesterreichische Luftverkehrs, Deutsche Luft Hansa and Czechoslovak Luftverkehrsgesellschaft jointly operated the Vienna-Prague-Dresden-Berlin line. Similarly, the Vienna-Budapest route with connections to Belgrade, Bucharest, Constantinople and Sofia was maintained cooperatively by the Compagnie Internationale de Navigation Aérienne, the Ungarische Luftverkehrs and Deutsche Luft Hansa. Polish interests, the Polskie Linje Lotnicze Aerolot, linked Vienna, Kattowitz and Warsaw; and French interests, the Compagnie Internationale de Navigation Aérienne, maintained service from Vienna to Bruenn, Kattowitz and Warsaw. These four routes were operated throughout the year.

The England-India air line of Imperial Airways, Ltd., crossed Austria on its hop from Nuernberg to Vienna and Budapest. Other services operated during the summer of 1930 connected Vienna with Berlin, Munich, Salzburg, Innsbruck, Zurich, Prague, Strasbourg, Paris, Venice, Graz, Klagenfurt, Agram, Rome and London. Twenty-four airplanes used by these regular air transport lines were in Austria.

* Kilometer is .62137 mile.
† Kilogram is 2.20462 pounds.
Two aviation schools, one in Salzburg and the other in Thalerhof, near Graz, trained pilots for the civil air lines, and three companies had planes available for charter flights. Licenses were required for all airplanes, pilots, mechanics and radio operators. There was no military aviation in Austria.

Belgium

Spurred by the largest appropriation ever made for aviation, Belgium developed its mail and passenger lines during 1930 and prepared to manufacture aircraft through the Société Anonyme Belge d'Exploitation de la Navigation Aérienne, or “Sabena” company. The budget for 1930 included an approved item of $2,300,000 for aviation. By Royal Decree, the Superior Air Council under the Ministry of Transportation was set up January 22, 1930, to act in advisory capacity on aviation matters.

In April the “Sabena” company opened night service between Brussels and London, permitting the delivery of letters in London early in the morning although they were mailed in Brussels late the night before. Several other services were maintained by the “Sabena” company: London to Antwerp, Antwerp to Amsterdam, Antwerp to Liege, Brussels to Luxemburg, and Ostend to Liege. Preparations were advanced for the establishment of the line connecting Belgium with her African colony, Belgian Congo, over a 7,500 mile route which was to be lighted by 1933. The French interests, through a subsidiary of Aéropostale, were to cooperate in the project.

Foreign air lines flying over Belgium included: Imperial Airways from London to Cologne; Farman, connecting Paris, Brussels, Rotterdam and Amsterdam; K. L. M., linking Rotterdam, Brussels and Basle; Farman, between Paris, Cologne and Berlin; and K. L. M., connecting Amsterdam, Rotterdam and London.

The Belgian Aeronautic Construction Company (“Sabca”), aided by government subsidy, manufactured airplanes of the Fokker type under licenses of the Dutch inventor. The manufacturing was capitalized at 20,000,000 Belgian francs ($560,000). The Ministry of National Defense subsidized three schools engaged in training pilots for civil and military service.

Bulgaria

Bulgaria's government limited its aviation activity to the training of pilots with 24 planes under the supervision of the Ministry of Railways. Under terms of the Treaty of Neuilly, the nation was not permitted to own or operate airplanes for military purposes, and its “state aviation” program had not been extended to transportation of mail or passengers, principally because of the lack of funds.
However, Bulgaria was served with air transportation through the Deutsche Luft Hansa and Compagnie Internationale de Navigation Aérienne. The former operated through Bulgaria on its Berlin-Prague-Belgrade-Sofia-Istanbul line and the latter from Belgrade to Constantinople by way of Sofia. The German line was permitted to stop at the airport near Sofia during 1930 for technical needs only. The French line carried 303 passengers, 2,510 kilograms of mail and 4,322 kilograms of goods without an accident. Arrangements were completed to permit the German line to land and receive passengers at Sofia in 1931.

Airplanes used by the government in its “state aviation” program were manufactured at Bojourishte, near Sofia, 14 two place biplanes valued at 10,000,000 leva* being produced. Engines were imported, none being produced in the country. Seventeen planes used by “Cidna” in its Bulgarian service were registered in France and five planes of the Deutsche Luft Hansa were licensed in Germany.

The only privately owned airplane in Bulgaria belonged to a German subject, the director of the German bank in Sofia, and was registered in Germany. The Bulgarian government was presented with a four place Focke-Wulf monoplane, powered with a Wright Whirlwind engine, during 1930.

Canada

Canada’s air transport lines continued to expand during the year while its manufacturing activities, like those of most nations throughout the world, were temporarily curtailed. From January 1 to September 30, 1930, 1,500,000 miles were flown by Canadian air lines with 95 per cent schedule efficiency, carrying 8,000 passengers and 379,424 pounds of mail over 6,382 miles of routes. Two pilots and three passengers were killed in these operations. Thirty-seven planes and 45 pilots and mechanics were employed in the maintenance of the services.

While the government granted no cash subsidies to air transport lines, it pursued a policy similar to that of the United States in awarding 17 mail contracts which amounted to $1,912,000 during the first nine months of 1930, and in providing $900,700 for maintenance of intermediate landing fields, lighting and radio. Nine hundred miles of airways had been lighted for night flying. Air mail routes operated regularly throughout the year included: Montreal to Detroit, 588 miles; Montreal to Albany, 200 miles; Sioux Lookout to Jackson Manion, 325 miles; Cranberry Portage to Kississing, 45 miles; Toronto to Buffalo, 100 miles; Fort McMurray to Aklavik, 1,676 miles; Oskelano to Chouguamou, 130 miles; Montreal to Moncton, 467 miles; and Winnipeg, Calgary, Regina and Edmonton,

* $1.00 is equal to 139 leva.
1,252 miles. During the summer, three additional routes were operated: Rimouski to Montreal, 330 miles; Montreal to Ottawa, 110 miles; and Lac du Bonnet to Wadhope, 82 miles.

Using planes to reach points inaccessible by other modes of transportation during winter, five other routes were operated during the cold months: Leamington to Pelee Island, 22 miles; Quebec to Seven Islands, 350 miles; Seven Islands to Anticosti Island, 120 miles; Moncton to Magdalen Islands, 200 miles; and Moncton to Charlottetown, 110 miles. Another route from Whitehorse to Dawson over a 275 mile route in the northwest was operated with mail on special schedules. Canadian Colonial Airways and Canadian Western Airways, both divisions of the Aviation Corporation, and Northwest Airways were among the American operators carrying mail and passengers into Canada from the United States on regular schedule.

Eight aircraft manufacturers produced 69 planes valued at $1,098,086 during the first nine months of 1930, while 54 planes were assembled or rebuilt with a value of $401,500. Three engine manufacturers assembled and rebuilt 123 engines in Canada during this period at a value of $413,839, exclusive of United States or British engines sold in Canada. The manufacturing industry was concentrated principally at Toronto, Montreal and Vancouver. The Curtiss-Reid Aircraft Company, Ltd., of Cartierville, Quebec, associated with the Curtiss Aeroplane and Motor Company, manufactured the two place Reid Rambler biplane. Boeing Aircraft of Canada, Ltd., affiliated with the American Boeing Company, concentrated on production of the Boeing six place flying boat. Bellanca Aircraft of Canada, Ltd., at Montreal was organized to sell and service planes of the American Bellanca company. Fairchild Aircraft, Ltd., at Montreal produced planes under license of its American parent company. Canadian Vickers, Ltd., of Montreal, manufactured the Vedette, a single-engined biplane; the Vancouver, a twin-engined biplane; and an American type. The De Havilland Aircraft of Canada, Ltd., imported units from its parent company in Great Britain and assembled the planes in Toronto. Ottawa Car Manufacturing Company, Ltd., of Montreal, held manufacturing rights to the Avro Avian. Three engine companies, two of them American, assembled and rebuilt engines in Canada. The American companies were Canadian Wright, Ltd., operating under manufacturing licenses of the Wright Aeronautical Corporation, and Canadian Pratt and Whitney Aircraft Company, affiliated with Pratt and Whitney Aircraft Company.

Aerial service operators did extensive charter and special work throughout Canada. Operators in the class totaled 115, using 400 airplanes. There were 50 privately owned airplanes in Canada during 1930. One hundred and six planes were employed in operations of the civil government, flying 11,552 hours during the first nine months of the year. Twenty-one light airplane clubs, operating under financial aid of the Dominion government,
had 2,887 members and flew 11,567 hours during this period, qualifying 120 commercial pilots and 374 private pilots. There were 403 commercial pilots' licenses in force during 1930 and 314 private pilots' licenses. Seventy-two airports were maintained, widely scattered throughout the Dominion, many of them lighted for night flying under a government provision allowing half the cost of such lighting on the regular air mail routes. Canada also maintained an air force using British equipment.

In cooperation with Great Britain, Canada constructed an airship base during 1930 at St. Hubert, Montreal, in support of the development of Empire communications by airship. The British airship R-100 made a successful experimental flight from England to Canada in July and made two flights in Canada as far as Toronto, returning to England in August.

China

Although all aviation in China was under control of the military authorities, aircraft saw action during 1930 in this far eastern country in both military and civil pursuits. Realizing that airplanes were well adapted to the transportation needs of a great country served by less than 6,000 miles of railways for an enormous, widely scattered population, China continued to encourage the development of regular air lines. Nationalistic rebellions during the year resulted in military skirmishes requiring aircraft, and provided an added market for American planes.

Air mail and passenger service was maintained daily each way between Shanghai and Hankow, 500 miles, with eight place Keystone-Loening amphibians powered with Wright engines. During the first year of operations ending October 21, 1930, 350,000 miles were flown without an accident or forced landing. On only two occasions were flights postponed, when typhoons were reported near Shanghai. The line was operated by the China Airways Federal, Inc., U. S. A. (formerly Aviation Exploration Company, Inc.), which is a joint Sino Curtiss-Wright enterprise responsible to the Chinese National Aviation Company. American pilots and Chinese copilots flew the amphibians along the great Yangtze river, whose broad surface provided excellent landing facilities at all times.

On the fighting side of Chinese military aviation, the use of pursuit and light bombing planes by the National forces during the summer of 1930 to defeat the Northerners in rebellion was considered an outstanding victory. Most of the fliers received their training at Canton and many of the planes came from that area. The air tactics employed by the government forces in this war were more extensive than ever before, and were considered far more effective. In Manchuria the young general, Marshal Hsueh-liang, had a fighting air force as an adjunct to his troops. An order was placed late in the year with an American firm in China for
six Waco fighting planes, powered with Wright Whirlwind 240 engines and equipped with two machine guns and two bombing racks, each carrying eight 25 pound bombs.

Although most aircraft used in China had been imported from the United States or Great Britain, there were three Chinese factories in operation during 1930, one in Shanghai, one in Canton, and one at Pagoda Anchorage, Amoy, Fukien province. The Shanghai and Canton factories were established to produce both civil and military planes, while the one in Fukien was to concentrate on the manufacture of seaplanes for the Chinese Navy. Only seven planes had been made in the three factories, most of them being produced in 1930. Parts, wings and fuselages were made in China of native materials, the engines alone being imported. A Wright Whirlwind engine was used in the three place reconnaissance seaplane Chiang Hung completed in 1930 at the Fukien factory.

Aside from several government training schools for military fliers, there was no activity which could be classed as aerial service operations. Since all flying in China was under the military arm of the government, there was no private aviation. A permit or “huchao” also must be obtained before an airplane can be imported into the country. Without a single airport which would meet American standards for a first class terminal, China faced the problem of building suitable ports during 1931 and the government planned a program to meet this immediate need.

Czechoslovakia

Granted cash subsidies from the government, three air transport companies operated the principal air lines in Czechoslovakia during 1930, cooperating closely with air transport interests in neighboring countries to double and triple traffic of the previous year.

The Czechoslovak Air Transport Company in conjunction with a newly organized Swiss company, Ad Astra, opened a new line during 1930 from Prague to Munich, Zurich and Basle. The company continued operation of the Vienna-Prague-Dresden-Berlin line in cooperation with the Deutsche Luft Hansa and the Austrian Air Transport Company, as well as its Prague-Rotterdam route, making 2,414 flights totaling 434,844 kilometers and carrying 3,473 passengers, 14,285 kilograms of mail, 41,929 kilograms of baggage, and 99,733 kilograms of goods to double and triple operating statistics for 1928. The company received a cash subsidy of 7,600,000 crowns ($223,529) in 1930 and was to receive 9,000,000 crowns ($264,705) for 1931. Eleven planes were used.

The Czechoslovak State Air Lines continued operation of its two lines: Prague-Marienbad and Prague-Brno-Bratislava-Kosice-Uzhorod. The company made 3,004 flights on these routes, covering 473,067 kilometers and
carrying 8,268 passengers and 183,859 kilograms of mail, baggage and goods. Compared with 1928, the company flew eight times as far and carried four times as many passengers during the year. Seventeen planes of six different types were used.

Compagnie Internationale de Navigation Aérienne, a French line operating the Paris-Warsaw route through Prague and the Prague-Istanbul line, made 2,294 flights from Prague, carrying 2,453 passengers, 4,920 kilograms of mail and 121,162 kilograms of baggage and goods. The Czechoslovak State Air Lines were provided with a cash subsidy of 7,400,000 crowns ($217,647) in 1930 and were to receive 8,500,000 crowns ($250,000) in 1931. The French line was given 3,500,000 crowns ($102,941) in 1930 and 4,600,000 crowns ($135,294) were to be provided for 1931. Contracts for lighting the route from Prague to Brno, the first to be lighted, were awarded in 1930.

Four aircraft manufacturers and five aircraft engine producers were operating in the country during 1930, although no official figures on the volume of their production were available. There was little activity in the aerial service field, while an official aviation school for training civilian pilots was operated in connection with the Prague Aeroklub. Fifty planes were being used by aviation clubs and only nine planes were owned by private individuals. Six well-equipped airports were situated at Prague, Brno, Bratislava, Kosice, Uzhorod and Marienbad; all were built and operated by the government. Licenses were required for airplanes and pilots, but not for mechanics. Planes were registered with the Minister of Public Works.

**Denmark**

Denmark's civil aviation activities were centered in the operations of Det Danske Luftfartselskab A. S. (The Danish Air Traffic Company, Ltd.), which operated in cooperation with the Deutsche Luft Hansa between Copenhagen and Hamburg from April to October and from Malmo, Sweden, to Copenhagen and Berlin from May until September. The Danish company maintained a line of its own from Malmo to Copenhagen and Hamburg from June until September.

The year witnessed 181,183 kilometers flown on these routes with 2,071 passengers, 6,722 kilograms of mail, and 40,675 kilograms of express. There were no fatalities during 1930 on the regular air lines of Denmark. Four Fokker monoplanes (Bristol Jupiters) were used in the service, which was subsidized by the Danish government to the extent of 250,000 kroner ($66,666) and by the City of Copenhagen to 100,000 kroner ($26,600) for 1930. No routes were lighted for night flying, but the government had spent about 1,000,000 kroner for buildings and lighting of the principal airport known as Kastrup Lufthavn. Licenses were required for all pilots,


mechanics and aircraft and periodic government inspection maintained. Three planes were privately owned in the country and 14 private fliers had been licensed.

While there were only seven civil airplanes in use, there were about 60 military planes in the country. The Naval Aircraft Factory at the Royal Dock-Yard and the Army Flying Corps maintained the only factories in Denmark for the production of aircraft, and concentrated during 1930 on military machines.

Egypt

Imperial Airways, Ltd., served Egypt with regular air transport service from London to Cairo, Basra and Karachi. The Air Survey Company, a British organization, undertook an air survey of the Upper Nile during 1930 under contract with the Egyptian Ministry of Public Works. There was practically no other aviation activity in the country; with the exception of visits of itinerant fliers.

Estonia

The Finnish Air Service Company continued operation of its service between Helsingfors and Tallinn, using four place Junkers monoplanes on the 54 mile route to connect with the operations of the German "Deruluft" company serving Berlin, Riga, Tallinn, Leningrad, Helsingfors and Stockholm.

Finland

The Aero Osakeyhtii (Finnish Air Service Company) increased its traffic on the three regularly operated routes: Helsingfors-Stockholm, Helsingfors-Tallinn, and Abo-Mariehamn-Stockholm. The lines were operated throughout the summer months, when flying was possible 24 hours a day because of the light nights and landings were made on the water, and during the winter months when hard ice was available for landings with skis. There were no fatalities on the lines during 1930.

The Osakeyhtii Sääski manufactured 11 airplanes for the military authorities valued at 1,980,000 Finnish marks ($49,896). A group of amateurs at Jyväskylä built four small planes during 1930, while no information on production in the government’s military plant was available. No engines were produced, all being imported. Production of engines was planned by the Ahjo Mekaniska Verkstads A. B.

One flying school maintained by the government at Kauhava trained 50 pilots during the year. There was no private flying, and the one airport under construction at Helsingfors was not yet completed.

France

With increases in traffic reported by each of the country’s five major air transport companies, French air transport concentrated mainly on the
development of lines already established during 1930. There also was little change in the complexion of the aircraft manufacturing industry in France during 1930, although for the first time the appropriations for subsidies to private individuals for part of the purchase price of touring airplanes was exhausted. Manufacturers specializing in small private planes expected a substantial increase in this appropriation to be voted by Parliament for 1931–32. The Government proposed 10,000,000 francs (nearly $400,000) as compared to 5,000,000 francs appropriated for 1930. The French aircraft industry produced planes valued at one billion francs ($40,000,000) during 1929.*

Subsidies continued to play an important part in the development of French aviation. Not only air transport lines, but manufacturers were granted government aid through cash disbursements and private purchasers of planes were given help. The principal subsidy in the general state budget provided 196,000,000 francs ($7,685,000) in 1930–31 with a proposal for 200,000,000 francs ($7,836,00) in the 1931–32 budget. In addition, the air lines were given premiums out of the postal budget for carrying the mail and the companies profited indirectly through subsidies provided for the training of civilian pilots and the operation of airports.

The Air Union Lignes d'Orient, organized as a subsidiary of Air Union for connections to the Near and Far East from Syria to China, was developed into a full-fledged independent company during 1930 taking the name Air Orient. In 1930, the company's lines extended over a sea route from Marseille to Naples, Corfu, Athens and Beirut, and by land plane to Damascus and Baghdad. From Baghdad to Bangkok, the service was assured by British and Dutch lines, the French line operating from Bangkok to Saigon with short branches from the latter point. Plans called for all-French operation of the line from Marseille to Saigon beginning in January, 1931.

Aéropostale, the principal French air transport company, operated lines during 1930 totaling 16,335 kilometers: Marseille-Perpignan-Palma-Alger, 1,075; Paris-Bordeaux-Madrid, 1,200; and Toulouse-Dakar-Natal-Buenos Aires and extensions, 13,980. Night operations were continued across the Pyrenees from France to Spain and between Tangier and Casablanca. On the France-South America route, planes were used from Toulouse to Dakar in Africa, where fast cruisers took the mail across the South Atlantic to Natal to turn over their cargoes to airplanes bound for Buenos Aires. Seaplanes were to replace the cruisers on the South Atlantic hop during 1931, although a round trip over this route during 1930 met with only partial success.

Air-Union continued to cater to its greatest traffic on the Paris-London route, with schedules coordinated to prevent conflict with the operations

of Imperial Airways, Ltd., on the same route. The Antibes-Tunis line was reorganized during 1930 to operate seaplanes from Marseille to Ajaccio and Tunis, with an extension from Tunis to Bône in Algeria. Other lines of the company included Paris-Marseille and Lyons-Geneva, with plans for operations in French Indo-China.

Compagnie Internationale de Navigation Aérienne, generally known as “Cidna” and controlled principally by French interests, operated from Paris to Prague and Warsaw. From Prague, another line was extended to Belgrade and Constantinople with alternate intermediate calls at Sofia and Bucharest. As the result of a Franco-Polish air convention in 1930, there was a prospect for the establishment of a second Paris-Warsaw line by way of Berlin. The company received subsidies from France, Czechoslovakia, Rumania, Yugoslavia and Poland.

Société Générale de Transports Aériens, more commonly known as “Sgota” or Farman lines, remained independent of other French lines and operated joint services, in collaboration with the Deutsche Luft Hansa and K. L. M., to Germany and the Netherlands. In cooperation with Aktb. Aerotransport, it offered regular service from Paris to Denmark and the Scandinavian peninsula. Passenger service was operated from Paris to Cologne and Berlin; freight service from Paris to Cologne, Essen and Berlin; Sunday passenger service from Paris to Berlin; passenger and freight service from Paris to Saarbrucken, Frankfort and Berlin; and twice daily passenger and freight service from Paris to Brussels, Antwerp and Rotterdam.

The Compagnie Transatlantique Aerienne maintained regular postal service from Paris to Cherbourg and less frequent postal service from continental points to Paris.

With the operating companies reporting increased traffic in 1930, it is interesting to examine the final operating statistics for 1929, the previous peak year in which increases of from 25 to 35 per cent. were experienced over 1928. French air lines flew 5,862,877 miles during 1929, completing 18,610 out of 21,363 announced flights for a general average of 87 per cent. Aéropostale led with 97 per cent regularity and Farman was second with 91 per cent. Passenger-miles in 1929 totaled 7,743,000. While the French companies did not announce the total number of passengers carried, it was estimated by them at 25,000. Mail measured in pound-miles in 1929 totaled 429,176,000, and express stood at 1,216,893,000 pound-miles.
Accident reports for 1929 showed 37 serious accidents to civil or commercial planes of which 18 were on air lines and 19 were in miscellaneous flying. The air lines employed 360 airplanes and 140 pilots in their services.

Since the French Army is recruited mainly by conscription, thousands of the nation’s youths enter training at military air schools each year. However, there was a need for private schools and five of them were operated by airplane manufacturers: Hanriot, Morane, Caudron, Blériot and Farman. There were 993 civil airplanes registered in France August 1, 1930, of which 110 could be identified as property of private individuals. There were 15 first class airports in France and Algeria, most of them operated by the government. All planes, pilots and mechanics were licensed by the government. France maintained an air force in its military establishment.

Germany

Aviation in Germany and the Deutsche Luft Hansa, the principal operating company, came to be recognized almost as synonymous. Since there was no military aviation in Germany (prohibited by the Versailles treaty) and since more than 90 per cent of German aviation activity was concentrated in this one subsidized company, the Deutsche Luft Hansa grew to a predominant position. The eleven companies engaged in the manufacture of aircraft and the four producers of engines,* consequently, concentrated their attention on the transport field, although some private sport planes were built. Private flying was relatively unimportant in Germany, judged by American standards, since there were only 120 privately owned planes and only 110 private pilots in the country.

Principally because the government had reduced the amount of its subsidy to the Deutsche Luft Hansa, no new lines were opened during 1930 and there was a slight reduction in the number of persons employed and the number of planes used. The subsidy for the fiscal year April 1, 1930, to March 31, 1931, was to be 19,000,000 marks ($4,525,000), greater than 1929 but less than the 22,500,000 marks granted in 1928. Operating statistics for 1929 showed that 9,087,694 kilometers were flown by the Luft Hansa, carrying 89,019 passengers, 690,699 kilograms of luggage, 366,845 kilograms of mail, and 1,198,790 kilograms of express. The number of miles scheduled daily in the summer of 1930 totaled 54,000 kilometers. Out of 56,000 regular landings at airports in 1929, there were 30 accidents which caused the death of two pilots and injured three, while six passengers were killed.

One hundred and fifty planes were employed by the Luft Hansa on its lines as compared with 225 in the preceding year, while 1,700 pilots, mechanics, and other employees were in its service as compared with 2,500

*Principal manufacturers listed in “The Aircraft Year Book for 1930,” p. 279.
previously. The reduction in subsidies was responsible for the cut. The total length of lighted airways was 1,435 kilometers. During the first ten months of 1930, 670,000 kilometers were flown over night routes.

The Luft Hansa’s principal mail and passenger routes operated during 1930 included: Berlin-Hanover-Amsterdam-London; Berlin-Danzig-Königsburg; Berlin-Hanover-Köln-Brussels-Paris; Berlin-Stettin; Berlin-Hamburg-Travemünde-Copenhagen-Malmö; Berlin-Leipzig-Nürnberg-München; Berlin-Leipzig-Stuttgart-Zürich; Basle-Barcelona; Berlin-Gleiwitz; Berlin-

DO-X HEADS FOR NEW YORK

Largest airplane in the world, the giant Dornier DO-X (12 Curtiss Conquerors) is seen over the Rhine country headed west. A slight mishap delayed its projected hop to New York from Lisbon.

Frankfurt-Mannheim; Heidelberg-Düsseldorf-Essen; Berlin-Dresden-Prague-Wien; Genf-Zürich-Budapest; Freiburg-Stuttgart-München; Frankfurt-Darmstadt; Frankfurt-Köln; Dortmund-Köln; Frankfurt-Nürnberg; Dortmund-Hanover; Hanover-Magdeburg-Berlin; Bremen-Hanover-Leipzig-Prague; Hamburg-Kiel-Flensburg; and Essen-Düsseldorf.

The Nordbayerische Verkehrsluft, a Bavarian company subsidized by several city governments but receiving no subsidy from the Reich, was the only other air transport company in Germany. It operated within Bavaria on four routes: Plauen-Leipzig; Leipzig-Erfurt; Dresden-Leipzig;
and Nürnberg-Dresden. It employed about 100 persons, including 15 pilots.

While planes could be hired from the Luft Hansa for short hops or taxi service, there was no aerial service operation in Germany comparable to that in the United States. There were 28 first class airports in the country, two of which were land and sea terminals, and 61 second class airports of which three were of the combination type. Aside from a few ports near the principal aircraft manufacturers, all airports in Germany were built by a concern whose members consisted one half of the municipalities and the other half of the state or federal authorities. All weather bureaus were maintained by the federal government, and the lighting of airways also was carried on by the Reich.

Germany’s important position in the field of lighter-than-air development has already been reviewed in an earlier chapter, “Projected World Airship Services.” The giant Dornier DO-X, the largest flying boat in the world, built in 1929, remained an unknown quantity as it prepared for a trans-Atlantic flight to New York in 1931. It was equipped with 12 Curtiss Conqueror engines in 1930 when the difficult flight to America was projected. The Junkers G-38, a huge land plane built in 1929, was used during the year principally in flights to state fairs and other exhibitions in Germany. There were no outstanding manufacturing developments in Germany during 1930, designs principally representing refinements of earlier models.

**Great Britain**

Imperial Airways, Ltd., the only air transport company operating on regular schedules in Great Britain supported by British capital, concentrated its operations during 1930 on existing routes, inaugurating no new services during the year. Regular service was maintained from London to Paris; London to Paris, Basle and Zurich; London to Brussels and Cologne; and England to India, the latter one of the longest air routes in the world, stretching 5,000 miles across ten different countries. Through the purchase of Cobham-Blackburn Air Lines, Ltd., Imperial Airways prepared to start weekly service between London and Capetown by way of Egypt.

Operating statistics of the company for its fiscal year ending March 31, 1930, showed that 1,345,217 miles were flown, compared with 1,032,842 miles in the preceding year. Passengers carried totaled 29,312 as compared with 28,483 in the preceding year. Mail poundage increased from 82.9 tons to 99.2 tons, while the volume of freight increased from 734.7 tons to 839.7 tons. The daily mileage flown by the lines totaled 5,305 as compared with 2,215 miles in the preceding twelve months. There were three major air transport accidents resulting in fatalities during the year.
Early in 1930, Imperial Airways had 22 transport planes in operation and three others were delivered for service later in the year. During the summer of 1930, the first four-engined 40 place Handley-Page air liners for use in England to India service were put into operation, and the Mediterranean division ordered a fleet of all-metal four-engined flying boats.

Subsidies for civil aviation in Great Britain during 1929–30 totaled £465,160, which represented a decrease of about £3,000 from the previous year. Increased provision was included for subsidy payments to Imperial Airways for its England to India service, but this was offset due to a decrease in capital expenditure on the Croydon Aerodrome. Imperial Airways was to receive £341,500 for its European and Indian services; Light Aeroplane Clubs, £18,000; and National Flying Services, Ltd., £500.

While the principal organized transport operations were carried on by Imperial Airways, several other companies engaged in aerial service and taxi work: Aircraft Operating Company, Ltd., Air Survey Company, Ltd., National Flying Services, Ltd., Air Taxis, Ltd., and Trost Brothers. Trost Brothers flew 23,150 miles and Air Taxis planes were in the air 700 hours during the year. Trost Brothers also transported 17,972 pounds of freight. Thirteen light airplane clubs with a total membership of 3,288 early in 1930 were assisted financially by the government, while there were eight non-assisted clubs. Out of the total membership, 750 held civil pilots'
licenses, an increase of nearly 60 per cent over the preceding year. There were four government-owned, five municipally-owned, and 20 privately-owned airports in Great Britain open to the public.

Since all airplanes must have government licenses, it was possible to check the number and uses of aircraft in Great Britain: air transport, 28; aerial service, 146; schools and R. A. F. training, 82; light airplane clubs, 62; experimental, 98; private, 184. This indicated a total of 600 civil and commercial airplanes in Great Britain. There were 3,349 pilots holding certificates early in 1930. Since British aircraft manufacturers do not make public their production figures, it was impossible to determine the number of aircraft produced by nearly a score of factories during 1930.* There were no new manufacturers established during the year.

The R-100, one of the government's two giant airships, was successfully flown to Canada and return during 1930, while its sistership, the R-101, crashed on a projected flight to India killing most of its crew and passengers. The successful flight of the R-100 and the R-101 disaster have been discussed in an earlier chapter, "Projected World Airship Services."

Great Britain maintained one of the largest air forces in the world as a part of its military establishment, but the strength of its units was kept secret.

**Greece**

Greece was served by an Italian air transport company, the Societa Anonima Aero-Espresso Italiana, which made Athens a regular stop on its route from Brindisi to Constantinople. The Blackburn Company, supported by British capital, was the only aircraft manufacturing organization in the country.

As a result of a new policy established by Premier Venizelos, who set up a Ministry of Aviation in 1929 with himself as director, Greece showed a new interest in military aviation during 1930. Contracts were signed during the year for the purchase of 52 British and French military planes for the new air force, and as many more planes were to be bought in 1931.

**Hawaii**

Service between the principal islands of the American mid-Pacific territory was maintained during 1930 by Inter-Island Airways, Ltd., operating two Sikorsky Amphibians and a Bellanca Pacemaker seaplane.

Hawaiian Airways, Ltd., had two planes for its aerial service operations. Hawaiian Aeronautical Industries, Ltd., had an American Eagle and a Swallow used in student instruction, and Western Pacific Air Transport had two Travel Air biplanes used in training student pilots.

*Principal manufacturers listed in "The Aircraft Year Book for 1930," p. 281.*
The U. S. Army Air Corps base at Wheeler Field, 20 miles from Honolulu, and the Naval Air Station at Pearl Harbor, 10 miles from Honolulu, were continued in operation with new equipment supplied to the air forces there.

Hungary

Forbidden by the Trianon treaty of 1920 to maintain military services, Hungary's civil and commercial aviation activities were under the direct supervision of the Royal Hungarian Ministry of Commerce. Government subsidies of about $225,000 were continued during 1930.

Regular schedules were maintained between Budapest and Vienna by the Hungarian Air Traffic Company in cooperation with the Austrian Air Traffic Company and the Deutsche Luft Hansa. The Hungarian company also operated a daily round trip service from Budapest to Belgrade, and one daily flight from Budapest to Graz.

The Manfred Weiss Aeroplane and Motor Manufacturing Company of Csepel held rights to manufacture Fokker, Caproni and Heinkel airplanes in Hungary as well as Gnome Jupiter and Siemens and Halske engines.

Iceland

Two Junkers planes leased from the Deutsche Luft Hansa were used by the Icelandic Aviation Company for service between Seydisfjord, Siglufjord, Akureyri, and Reykjavik. The planes also were used for scouting herring during the fishing season.

India

India was linked with England and the nations of Europe through the England to India service of Imperial Airways, Ltd., which operated in India from Karachi to Delhi, the capital. The service was operated weekly in both directions throughout the year.

The British government maintained an air force in India of 224 officers, 1,789 men and 96 airplanes. There were 49 airports in India, including those used by the Royal Air Force. Private flying was concentrated in several light airplane clubs, subsidized by the government and operated at Delhi, Karachi, Bombay, Calcutta, Madras, Rangoon and Allahabad.

Irish Free State

Despite announcements in 1929 of the formation of an Irish air transport company to link Galway with London, 1930 found the Irish Free State without an air transport service. However, one taxi service had three airplanes in use for charter work and the Irish Aero Club in Dublin was
engaged in training civil pilots. There were nine privately owned airplanes.

The Irish Free State Government in March, 1930, promulgated Air Navigation Regulations providing for the granting of licenses for airplanes, pilots, and ground engineers and set up air traffic rules for the guidance of all fliers. No licenses had yet been issued at the close of 1930.

Seven new British planes were delivered to the Irish Free State Army Air Corps during 1930, four of them training planes and three fighting planes. The Irish Aero Club sought to obtain a subsidy from the government for an air transport line.

Italy

Italy, with its Premier definitely convinced of the value of aviation for civil and military purposes, continued to carry out its extensive program for developing Italian air transport lines, encouraging Italian aircraft manufacture, and maintaining a military establishment with an adequate air force.

Since the program for civil aviation was undertaken in 1926, the length of routes in operation increased three and one half times, the total distances flown five and a half times, the number of passengers carried five times, the amount of mail and newspapers carried 40 times, and the weight of baggage and freight 11 times. In 1929 as compared to 1928, the length of routes operating increased 73 per cent, total mileage flown 48 per cent, passengers carried 61 per cent, baggage and freight carried 57 per cent, while the quantity of mail and newspapers carried increased more than threefold. As 1930 opened, Italy had air routes totaling 13,332 kilometers in operation. The year just passed had seen 2,962,277 kilometers flown on these routes, with 25,298 passengers, 61,480 kilograms of mail and newspapers, and 453,029 kilograms of baggage and freight carried. There were 25 civil transport lines in operation covering all of Italy and most of the Mediterranean basin. Passenger rates were reduced practically to rail and steamship rates as heavy government subsidies aided the operators.

The Italian aviation budget for 1930–31 totaled 718,000,000 lire (about $40,000,000), of which 79,418,000 lire, or 11 per cent of the total, was for civil aviation. This represented an increase of 18,000,000 lire over the previous year, almost all of which was added for civil aviation. The air transport lines received 74,500,000 lire for 1930–31, the remainder of the subsidies being used for competitions, conferences, flying clubs, air fields, and meteorological services. Seven major air transport companies were the recipients of most of the subsidy.

The Societa Italiana Servisi Aerei (S. I. S. A.) with its base near Trieste, operated five lines: Trieste-Lussino-Zara-Ancona, 337 kilometers; Trieste-
Fiume-Lussino-Zara, 310 kilometers; Trieste-Fiume-Brioni-Venice, 220 kilometers; Trieste-Venice-Pavia-Genoa, 595 kilometers; and Turin-Pavia, 132 kilometers. Seaplanes were used exclusively on the line.

The Societa Anonima Navigazione Aerea at Genoa operated from Genoa to Rome, Naples to Palmero, Rome to Barcelona, Rome to Marseille and Rome to Tripoli. Fares on this line were radically reduced during the year.

The Societa Anonima Aero-Espresso Italiana, based at Rome, operated between Brindisi, Athens and Constantinople.

PREPARING FOR INTERNATIONAL RACE

Seven entries in the Gordon Bennett Balloon Race are filled with gas at the starting point in Cleveland. Goodyear VIII (second from left) won.

The Societa Anonima Trans Adriatica with headquarters at Venice continued operation of its service between Rome, Venice and Vienna and added a new service in September, 1930, from Venice to Ancona and Brindisi. In May, another line from Venice to Trent had been opened to connect with lines to Munich, Paris and London.

The Societa Anonima Adria Aero Lloyd at Tirana, Albania, operated solely within Albanian territory between Tirana and Koritza; Tirana and Scutari; and Tirana and Valona.

The Societa Aerea Mediterranea, with its base at Rome, entered into a new contract with the Ministry of Aviation during 1930 for the subsidization of its routes: Rome-Tunis, Cagliari-Tunis, Rome-Palermo-Tunis and Rome-Naples-Brindisi.
The Societa Anonima Avio Linee Italiane also entered into a new contract for daily service between Rome and Milan, a daily service for six months of the year between Milan and Munich, a daily service for eight months of the year between Milan and Turin, and tri-weekly service for six months between Milan and Trent.

Private ownership of light planes was encouraged through the subsidization of clubs and the development of a touring competition around Italy. Sixty private planes were entered in the reliability tour, 52 started and 37 finished. The winner, Col. Paridi Sacchi, averaged 104 miles an hour.

One of the most important group flights ever projected was started late in the year when 14 giant Savoia Marchetti S-55 seaplanes left Italy for a flight to South America across the South Atlantic. The flight was undertaken by the military authorities with the Minister of Aviation participating. Minister Balbo had reported to the Chamber of Deputies earlier in the year that Italy had three pilots trained for each of its 800 to 900 war planes, and received a round of applause from the legislators with Premier Mussolini joining in the ovation.

Every effort was being made to perfect Italian planes for use on the nation's air lines and in its military services, but the reliability of foreign craft was not being overlooked where it promised to be of greater service than domestic craft. Foreign manufacturers had been encouraged to build planes in Italy with government aid and Italian materials, looking to the day when Italy might turn out all of her aircraft without foreign aid.

Japan

Although the Japanese people could not be said to be "air-minded," the Japanese government has recognized the importance of aviation for military and civil purposes. Organized as a separate military arm, the Japanese Military Flying Corps in 1930 had 3,700 officers and men, 26 squadrons and 500 first line airplanes. German, British, French and American planes, as well as some of Japanese manufacture, were in use in Japan.

The Nippon-Koku-Yuso-Kaisha (Japan Air Transport Company) continued to be the principal operating company in Japanese civil aviation, charged with the ambitious program of the government for carrying mail, passengers and express from Tokyo to Dairen. During the first year of operation, the company carried 2,755 passengers and 18,946 pounds of mail in its 12 Fokker monoplanes purchased in the United States and Holland. Traffic increased so rapidly that from April to July, 1930, almost as many passengers and as much mail were carried as during the entire first year: 2,325 passengers and 15,251 pounds of mail.

The only other air transport company in Japan, the Nippon-Koku-Yuso-
Kenkyuko, also was subsidized by the government and carried mail and passengers from Osaka to Matsuyana. Its traffic was about one fourth that of the former company. There were no accidents in Japanese commercial aviation during 1929 or 1930.

The projected route from Fukuoka, Japan, to Shanghai had not been opened at the close of the year. It was reported that the German government had proposed the establishment of service between Tokyo and Berlin, via Suez. Japanese officials were reported to favor the proposition and negotiations were still under way at the close of the year. Such a line would, of course, include the Fukuoka-Shanghai route.

There were 11 civil and three military aviation schools in Japan. Manufacturing of aircraft and engines was principally confined to production under license agreements with European concerns. There were 34 airports in Japan, three of them civilian ports of outstanding importance.

Latvia

Latvia, without air lines or commercial aviation of its own, was linked with the extensive European air line network through a line operated by the German-Russian "Deruluft" company through Riga between Berlin, Koenigsberg and Tallinn. From Tallinn, service was available to Leningrad, Helsingfors and Stockholm. The planes were well patronized by the travelling public.

From May until November, 1929, the "Deruluft" reported 300 passengers carried on the line from Riga alone, with 449 passengers passing through the city from other points. Mail totaled 1,560 kilograms and freight weighed 2.01 metric tons. The volume of business in 1930 was considerably above the 1929 level, with as many passengers carried in April and May as were transported during 1929.

The Latvian army had 45 airplanes in service, operating from its base in Riga. The navy, devoted to coast defense, had 12 airplanes in use.

Netherlands and Netherlands East Indies

The Netherlands during 1930 continued the development of its extensive air transport services, one of which extended over the long route to the East Indies, as well as its military air force. Four companies were engaged in the manufacture of aircraft with a large share of their output being exported. No engines were produced, all being imported from foreign countries.

The Koninklijke Luchtvaart Maatschappij (Royal Dutch Air Lines) or K. L. M. reopened its fortnightly service from Amsterdam, Netherlands, to Batavia, Dutch East Indies, in September, 1930, when a tri-motored Fokker piloted by Evert van Dijk, co-pilot of the "Southern Cross" with
Kingsford-Smith, left Holland on the long flight to the east. Cities served enroute included: Nuremberg, Germany; Athens, Greece; Cairo, Egypt; Baghdad, Arabia; Bushir, Djask, Karachi, Jodphur, Allahabad, Calcutta, Akyab and Rangoon, all in India; Bangkok, Siam; Sengora, Straits Settlements; Medan, Palembang, Bandoeng and Batavia, all in the Netherlands East Indies.

The K. L. M. continued the operation of its European routes with increased traffic loads during 1930: Amsterdam-Rotterdam-London; Amsterdam-London; Amsterdam-Rotterdam-Paris; Amsterdam-Hamburg-Copenhagen-Malmo; Brussels-Paris; Lympne-Ostende; and Amsterdam-Bremen-Hamburg. Because of the necessity for adding extra sections to care for increased traffic, K. L. M. flew 1,028,000 miles during the year ended September 30, 1930, although the schedule called for 861,771 miles. During this period, the company carried 17,726 passengers, 209,138 pounds of mail, and 2,112,129 pounds of freight. The lines called for 4,672 miles to be flown daily during the summer of 1930 and 1,078 miles daily during the winter months. There were no accidents during the year. Twenty-one Fokker planes were used, with 18 pilots and 430 other persons employed.

The K. L. M. received a government subsidy of Fl. 1,000,000 ($400,000) during 1930, the largest amount it had ever received in a single year. There were no aerial service operations in the Netherlands except occasional flights of the K. L. M. The National School of Flying at Rotterdam had exclusive rights to train non-commercial pilots. Ten were trained during 1930, with 48 under instruction. Nineteen licenses had been issued to private fliers and ten planes were owned privately, principally by members of the Rotterdam Aero Club, which had 300 interested members. Schiphol and Waalhaven, the two principal commercial airports in Holland, ranked with the best in Europe.

Aircraft manufacturers in the Netherlands included: Nederlandsche Vliegtuigenfabriek, the original plant of Anthony Fokker; Maatschappij voor Vliegtuigbouw, manufacturers of Dornier metal flying boats; H. Pander and Zoon and Koolhoven Vliegtuigen, both manufacturers of light planes. No engines were made in Holland. Fifty-four planes were exported in 1929, and 50 were sent out of the country during the first eight months of 1930. There were no statistics on the total volume of domestic manufacture.

In the Netherlands East Indies, the K. N. I. L. M. (Koninklijk Nederlandsch-Indische Luchtvaart Maatschappij) maintained five routes: Batavia-Bandoeng, 70 miles; Batavia-Semerang-Surabaya, 400 miles; Batavia-Palembang, 370 miles; Batavia-Palembang-Singapore, 725 miles; and Batavia-Palembang-Pakan Barce-Medan, 1,100 miles. From November 1, 1928, to September 1, 1930, 4,494 flights covering 663,800 miles were made over
these routes, carrying 28,046 passengers, 420 metric tons of baggage, 142 metric tons of freight and 15,862 pounds of mail. The company received a subsidy from the colonial government. One private plane was owned by the Netherland India Aero Club.

The Netherlands military establishment includes an army air unit with 172 airplanes, including 100 observation planes and 35 training ships. The navy air unit had two seaplanes aside from several on naval ships and one on a submarine.

New Zealand

While there were no air line services in New Zealand, the government encouraged aviation development by granting subsidies to 21 light airplane clubs. Many of the clubs had their own landing fields, hangars and other facilities. The government furnished each club of 30 members with two light planes and provided $150 as a cash subsidy for each new pilot trained by the club.

Norway

The Norske Luftfruter (Norwegian Air Transport Company) cooperated with the Deutsche Luft Hansa in the operation of passenger service between Oslo, Malmo and Copenhagen during the summer months, with more than 1,500 passengers carried on the route.

Air mail service between Oslo and Malmo was again given a trial through a government contract with Halle and Peterson, who carried on the service successfully for two months, carrying 4,000,000 letters. The government considered making a permanent contract for the service.

Persia

The Junkers Luftverkehr Persien, a German company, continued to hold a monopoly on civil aviation in Persia, although Imperial Airways was permitted to cross southern Persia from Baghdad to Karachi with stops at Bushire and Jask on their England to India service. The German company linked Teheran with Baghdad, a flight of six hours as compared to three and a half days by train and motor.

The Persian army continued its activities with six or more Junkers planes.

Philippine Islands

The Aviation Corporation of the Philippines continued preparations for the opening of regular service from Manila to Iloilo, Cebu and Davao, and eventually to China and Australia. Equipment had been ordered for operation of the line.

Poland

The semi-governmental communal air transport company, Polske Linje Lot, which took over all Polish air transport with the exception of one
line in 1929, continued the development of its services during 1930. Its regularly operated routes totaled 2,892 kilometers with more than 5,000 kilometers being flown daily: Warsaw-Danzig; Warsaw-Lwow; Warsaw-Poznan; Warsaw-Katowice-Krakow; Katowice-Brno and Brno-Vienna. The system was extended during the year to Bucharest through Rumania to provide connections to the Baltic and Black Seas during a single day's flight. Fares charged by the line approximated first class rail rates.

The Compagnie Internationale de Navigation Aérienne, a French line which had previously been granted certain concessions, continued to operate from Warsaw to Prague and Paris.

Twenty-six planes were used by the Polish air line on its routes, making 2,696 flights over 623,149 kilometers during the first six months of 1930, carrying 5,778 passengers, 19,057 kilograms of mail and 254,419 kilograms of merchandise. The company also undertook aerial survey and taxi work during 1930.

Private flying in Poland was centered about the activities of the Polish Aeroklub and 12 affiliated flying clubs, which made 12,370 flights during 1929-30 for a total of 5,317 hours in the air. Gliding also was becoming popular. The Polish government devoted considerable attention to the provision of radio navigational facilities for planes and to the lighting of airports and routes for night flying.

Four manufacturers of aircraft and three producers of engines were operating in Poland during 1930.

Portugal

Regular biweekly service between Lisbon and Madrid operated for four months during 1929 by the Serviços Aereos Portugueses, in connection with the German Junkers interests, was discontinued because of lack of traffic. During the four months of operation only 79 passengers and 2,714 kilograms of mail and merchandise were transported. The company opened a taxi service in July, 1930, and 190 passengers were carried during the three months that the single Junkers plane was used in this operation.

The Companhia Portuguesa de Aviação announced an ambitious program for 1931: Lisbon to Paris, Lisbon to the Azores, Lisbon to Madeira, Lisbon to Tangier, and Lisbon to Algiers. In cooperation with the French Aéropostale, it planned service from Cape Verde Island to Dakar and from Portuguese Guinea to Dakar. Two other services were considered in coordination with the French Compagnie Transafricaine d'Aviation: Lisbon to Angola and Lisbon to Mozambique. Air lines in Portugal were not aided by the government in any way.

The Portuguese Army Air Corps had 68 planes in use and the Navy Air Service had 29 ships. Three planes owned by the two transport com-
panies were the only other aircraft in the nation in 1930. There was an international airport at Alverca, 18 miles north of Lisbon, and about five small landing fields at other points. The Aero Club of Portugal organized a school at Lisbon in 1930 and 12 students were under instruction, but none had been graduated.

Rumania

Rumanian army planes and pilots were used during 1930 on four services operated by the Rumanian government: Bucharest to Galatz; Galatz to Issay; Issay to Czernowitz; Bucharest to Sibiu; and Sibiu to Cluj. Fares were slightly lower than first class railroad rates.

Siam

Siam was linked by air with Europe during 1930 with the establishment of the K. L. M. (Royal Dutch Air Lines) service from the Netherlands to the Dutch East Indies with a stop at Bangkok, Siam. The service also provided fast transportation to important cities in India passing through enroute to Holland.

The Siamese Army had maintained air lines into the interior of Siam for six years, using Army planes and pilots. These services were continued during 1930 with passengers, mail and merchandise being transported to points in the interior, unpenetrated by roads or railroads. Siam had several American airplanes, including two Curtiss Hawk pursuit ships, in its service and held rights to manufacture the Curtiss planes for domestic use.

Spain

Spain was served with air lines totaling 874.2 miles on October 1, 1930. The principal operating company, Concesionaria de Lineas Subvencionadas or "Clasa," received 1,500,000 pesetas annually from the government and held certain monopolistic rights. Allied with the corporation, although operating independently, were Unión Aerea Española and Jorge Loring.

Services in operation during 1930 included: Madrid-Barcelona; Madrid-Sevilla; Sevilla-Larache, Morocco and Sevilla-Granada. The Madrid-Lisbon and Madrid-Biarritz-Paris services, operated in 1929, were discontinued as unprofitable. During 1929, 242,711 miles were flown on these lines, carrying 4,888 passengers, 19,223 pounds of mail and 42,372 pounds of express. Wright Whirlwind engines were used for the initial flight on a new line from Madrid to the Canary Islands, over a difficult airway of desert and sea.

Three aircraft manufacturers and four engine producers, most of whom were operating under rights to foreign patents, were in production during 1930. During 1929, 174 complete planes were manufactured in Spain. Aviation schools were operated in Madrid, Barcelona, Alcalá de Henares,
Guadalajara, Cartagena and Albacete. Thirty planes were in use at the last named school alone. Private flying was confined principally to flights of visiting tourists from other countries. Nineteen first class airports and 40 landing fields, constructed with government aid, served Spain. Licenses were required for planes, pilots and mechanics.

Spain continued to show considerable interest in lighter-than-air development, although it owned no airships. The airport at Sevilla was equipped with a mooring mast and was destined to become a port of call on the Europe-South America airship route.

Spain maintained an air corps in its military establishment, and experienced a shock late in 1930 when the rebel hero, Ramon Franco, who attempted a trans-Atlantic flight, used Army planes to distribute revolutionary propaganda over the capital. He was later held in Portugal when refuge was sought there.

**Straits Settlement**

Straits Settlement found itself linked with the principal countries of Asia and Europe in the fall of 1930 when the K. L. M. (Royal Dutch Air Lines) opened service from the Netherlands to the Dutch East Indies, stopping at Sengora in the Straits Settlements. Several local services also were considered.

Sportsmen in the Federated Malay States established an airplane club to promote interest in aviation.

**Sweden**

The Aktb. Aerotransport (Swedish Air Transportation Company or A. B. A.) received a subsidy from the Swedish government of 500,000 crowns ($133,900) to aid it in the operation of its services within Sweden and, with the cooperation of the Deutsche Luft Hansa, the Finnish Aero O/Y, and the Dutch K. L. M. lines, to neighboring countries.

The A. B. A. maintained regular service during favorable months of the year between Malmo and Amsterdam, Stockholm and Helsingfors, and Malmo and Hamburg. During 1929, 2,582 passengers, 35,052 kilograms of freight, 47,245 kilograms of baggage and 56,047 kilograms of mail were carried on these lines. The total distance flown on the regular lines during the year was 283,821 kilometers. There was an increase in traffic reported for 1930, although statistics for the year had not yet been compiled. Halle and Peterson, contractors to the Norwegian government, also operated a trial service from Oslo to Malmo. The Deutsche Luft Hansa opened a service in May, 1930, from Berlin to Copenhagen, Goteborg (Sweden) and Oslo.

The Flying Club of Stockholm obtained a Junkers training plane during 1930 for the use of its members. The Royal Swedish Aero Club
promoted a flying meet which attracted 40,000 persons to the Bulltofta airport, near Malmo, to witness 16 airplanes perform. Considerable work was done during 1930 in equipping and improving the airports at Malmo and Stockholm. Two manufacturers continued their production of planes, principally for use by the Swedish Air Transportation Company.

Switzerland

Eight air lines, all but one of which were foreign companies, served Basel in the heart of Switzerland during 1930. The single exception was the Basel Air Traffic Company, generally known as "Balair," which was capitalized at 500,000 Swiss francs ($96,525). It used five Fokker trimotored monoplanes on its services which hurdled the difficult Alps and Pyrenees on regular schedule. Eighteen Wright Whirlwind engines were imported during the year at a cost of $79,560 to power these planes on their difficult daily flights.


On July 5, 1930, a new air mail service was inaugurated between Basel and the French ports of Cherbourg and Le Havre for improving the postal service between the United States and Switzerland. Steamers from or to the United States were met by airplanes with a saving of from 24 to 48 hours in the delivery of mail.

From January 1 to September 30, 1930, 6,634 passengers were carried on the several air lines entering Basel. These lines carried 56,028 kilograms of mail, 100,979 kilograms of freight, and 48,500 kilograms of baggage. School and training flights at Basel during this period totaled 1,903. There were no casualties during 1930.

The Swiss Military department maintained an air unit with more than 100 planes in use.

Turkey

Two air lines, one French and the other Italian, served Turkey during 1930 and represented all civil aviation activity in the country. The Societa Anonima Aero-Espresso Italiana maintained a semiweekly service between Constantinople and Brindisi by way of Piraeus, Greece. The Compagnie Internationale de Navigation Aérienne (French) operated between Constantinople and Paris.

There were no privately owned planes in Turkey. Numerous sections of the country were marked off as military zones through which no airplane might pass. This fact had no small influence upon the curbing of private interest in aeronautics.
The Ministry of National Defense directed all military aviation in Turkey and the government maintained a rigid censorship of all matters pertaining to the conduct of its affairs.

Union of Soviet Socialist Republics

Spurred by the ambitious program of the Soviet government to place the U. S. S. R. in a predominant position among the nations of the world in aviation, traffic increases were effected on the air transport lines, the first all-Russian tri-motored airplane was built, and the military air forces were further developed during 1930.

Soviet airways in 1930 totaled well over 20,000 kilometers, linking the principal cities of the country with centers in Europe and Asia. Three organizations operated air transport services in Russia. The oldest, a German-Russian company known as the "Deruluft," connected Moscow with Berlin and Leningrad with Koeningsberg in the only existing air links between Soviet Russia and western Europe.

The Ukranian Airways Company (Ukrvozdukhput) operated from Moscow through central southern Russia to the Caucasus and Persia, going as far as Teheran. The most important Soviet air transport company was the "Dobrolet," which maintained 12,000 kilometers of airways into Siberia and Central Asia, operating at temperatures as low as 67 degrees below zero with full loads.

There were 20 aircraft manufacturing companies in Soviet Russia during 1930, but the majority of them were either engaged in producing planes on foreign patent rights or fabricating foreign planes shipped in as parts. Early in 1930, the first tri-motored all-metal monoplane produced entirely of Russian materials with Russian labor was produced. It was designated as the A. N. T. 3, and carried 11 passengers.

Thirty-five airports throughout Soviet Russia were maintained by a society of affiliated flying clubs known as the Ossaviachim. Airplanes and pilots were licensed by the government. The Soviet military air service had approximately 90 squadrons of 12 planes each with about 800 pilots who had been trained in 14 military flying schools maintained by the government.

Yugoslavia

The Yugoslav government moved to aid aviation enterprises by making provisions to exempt aviation companies from taxation for a period of 25 years. The Yugoslav Air Transportation Company operated mail, passenger and express service between Belgrade and Zagreb, 235 miles, and the Compagnie Internationale de Navigation Aérienne (French) maintained daily service from Belgrade to Paris and triweekly service from Belgrade to Constantinople.
CHAPTER XIX

OUT OF THE ENGINEERING LABORATORY

Design Trend Toward Greater Pay Load and Higher Speed—Attention Concentrated on Aerodynamic Efficiency—Effect of Watres Bill
Metal Utilized—Autogiro—Helicopter—Safety Devices

UNMARKED by any radically new developments in aircraft design, 1930 witnessed a concentration upon projects in the engineering laboratory which were productive of important refinements in airplanes, engines and instruments. Not concerned with problems of volume production during a decidedly lean year, engineers and designers employed by the more substantially financed companies were able to focus their attention upon improvements of products which might not have been possible during a period of heavy production. Inspired by confidence in the future of a normal market, the major manufacturing companies proceeded with their experimental programs, taking proper regard for economy into consideration.

The truth of the definition of a commercial airplane as one which can support itself in the air financially became increasingly evident among designers and production managers, although one of their number originally concocted the definition in jest. There was a distinct movement toward effecting production economies which might make possible the manufacture of airplanes and engines suitable for specific tasks at a cost low enough to command an economic price and efficient enough to permit low operation expenses. It caused some manufacturers to take certain models out of production and to concentrate on other established types or new designs which showed greater promise of commanding a place in the potential market of the immediate future.

The events of the year had a marked influence on the trends of design. This can be readily observed from reviews of the manufacturing activities of the various companies in the chapters “Manufacturing American Aircraft” and “Producing American Engines.” This also can be learned from an examination of the extensive section of three-view drawings immediately following this chapter, which shows the types and models produced during 1930 in the several fields, including multi-motored transports, light transports, mail transports, planes for private operations and aerial service, and important military types for the Army and Navy. It is not the purpose of this chapter to present a detailed review of the changes made by each manufacturer on his product, but rather to indicate the year’s trend...
in engineering investigation and design as seen through the critical eyes of more than a score of the nation's leading aeronautical engineers whose composite observations will be presented. Each submitted a comprehensive memorandum outlining his views at the request of the editor of "The Aircraft Year Book" to be used as the basis for this chapter.

**Effect of McNary-Watres Act**

The stimulation of passenger carrying business and the remaking of the air mail map resulting from the McNary-Watres Act had a profound

![HIGH SPEED MAIL PLANE](image)

Boeing Monomail (Pratt and Whitney Hornet), new metal low wing monoplane, is designed to carry heavy load of mail at speeds 150 miles an hour.

effect upon the cleaning up of designs in the heavy transport field and the introduction of new light transport models which promised to meet the needs of contractors for carrying both mail and passengers on frequent schedules. The air transport operators wanted faster ships with greater pay loads and designers concentrated their attention upon this problem. Frequency of schedules placed a premium on efficient ships which could carry from four to twelve passengers in addition to a mail load, rather than stimulating the huge transport types which carried a score or more passengers. The big transport ships found favor, however, on heavily patronized routes, especially on the west coast. East coast operators, competing with frequent rail service over relatively short distances, preferred
RESULT OF McNARY-WATRES ACT

Bellanca's answer to the new air mail act, a 12 place sesquiplane carrying mail in the lower wings, powered with a Curtiss Conqueror and known as the Airbus.

BELLANCA AIRBUS INTERIOR

Passenger cabin of the new Bellanca single-engined transport introduced during 1930 for mail and passenger carrying under Watres Act.
to employ extra sections of the ten place type when necessary on frequent schedules, rather than consider the larger ships.

Increases in airplane performance, often obtained in past years simply through increased power, were achieved during 1930 through refinements resulting in greater aerodynamic efficiency. Speeds were increased from 15 to 25 per cent. by employing low drag cowling on air cooled engines. Increased attention also was given to the fairing of wing fillets, strut intersections and landing gears. "Pants" or "spats" made their general appearance upon the landing gears of many

![Image of an airplane](image)

**IN MOTOR CAR PRICE CLASS**

American Eaglet, a two place open cockpit monoplane powered with a 40 horsepower Salmson engine, is illustrative of the trend in the low-price field established designs, while several new designs employed retractable landing gears to reduce the air resistance of exposed parts. The refined Ford tri-motor was an outstanding example of how manufacturers were able to boost the speed of models already in production through a cleaning up of the design. The Boeing Monomail, Northrop Alpha, Travel Air Mystery Ship, Lockheed Sirius, Consolidated Fleetster, Fokker XO-27 and Bellanca Airbus were outstanding examples of the new trend which emphasized the importance of greater aerodynamic efficiency in design. The progress toward increased design efficiency was particularly commendable as opposed to the past tendency of obtaining higher speeds through increased power. Such designs tended to decrease the ratio of pay load to
horsepower, which is quite an accurate measure of a ship's inherent operating economy. The new increases in speed, made without a sacrifice of pay load, not only resulted in a saving of fuel and a reduction of time for a given trip, but also in a reduction of the number of airplanes necessary to operate an air transport line. This meant a saving in overhead expenses which constitute a major part of the cost of air line operation.

**Use of Metal Increased**

One of the most promising advances made during the year in the construction of airplanes was the increased use of metal to replace wood and fabric in all major structures. Development of stressed skin all-metal wings and monocoque fuselages, such as those used in the Boeing Monomail, Northrop Alpha, Thaden T-4, and Fleetster were considered particularly important. The fact that this project was being attacked by leading designers throughout the country simultaneously was bound to result in a faster and more general accomplishment. The intelligent utilization of aluminum alloy sheets in the structure of monoplane wings accomplished greater rigidity in torsion to resist incipient wing flutter and produced a smoother and more aerodynamically efficient outside surface. It
was found through the use of such metals that the wing covering could be made to carry an appreciable part of the load and to obtain a degree of rigidity never before accomplished in monoplane wings.

The increasing use of metal made improvements in production methods obligatory. The production engineers were responding to the demands, and as a result improved methods of assembly and improved tools were keeping pace with design. These production improvements were rather diversified and embraced such important factors as spot welding and rapid machine riveting. Although little of its possibilities were yet known in 1930, the introduction of stainless steel in the thinner gauges was considered of outstanding importance to aircraft construction. It was expected to prove the best material yet produced, and many engineers predicted its general use "in the not too far distant future." Stainless steel presented the ideal characteristics of physical properties and corrosion resistance. The latter was a factor of such paramount importance that some designers declared it would exert a trend toward the replacing of duralumin in airplane structure with stainless steel. This, however, was for the future to determine.

Greater Pay Loads

In the single-engined transport field, the Bellanca Airbus, two Boeing Monomail models, Consolidated Fleetster, Fokker F-14, and Northrop...
Alpha were illustrative of the trend toward ships with greater pay load in proportion to their horsepower. The new Bellanca and Boeing planes showed performance better in most respects than that of tri-motored ships double their horsepower, and their indicated cost of operation was approximately 50 per cent of their three-engined sisters. The design of these ships included many interesting departures from the conventional.

The Bellanca Airbus was a sesqui-plane having large upper wings, short lower wings and auxiliary wings joining the two together to act as a "FLYING WING" in flight. Long discussed by engineers as the most efficient design aerodynamically, a ship of this type was flown experimentally by Northrop Aircraft Corporation during 1930.

Bracing struts in addition to lifting surfaces. The lower stub wings formed the landing gear structure, the wheels being faired into them where the auxiliary wings join, thus eliminating the drag of the landing gear as a separate unit. It was powered with a Curtiss Conqueror, Pratt and Whitney Hornet or Wright Cyclone engine. Baggage was carried in specially constructed pits underneath the seats rather than in a compartment at the rear of the cabin. Designed to meet the requirements of air transport operators under the McNary-Watres Act, it had provisions for carrying mail in pits in the lower stub wings having a capacity of 60 cubic feet. Loading and
unloading was accomplished outside the cabin without interfering with passengers.

The Boeing Monomail was a low-wing, all-metal, single-engined monoplane powered with a 575 horsepower Pratt and Whitney Hornet engine. Completed during the summer of 1930, it carried a payload of 2,300 pounds at a cruising speed of 140 miles an hour and a high speed of 158 miles an hour. The Monomail 200 was designed as an all-cargo ship with the pilot in an open rear cockpit, while the Monomail 221 carried from six to eight passengers in addition to a cargo of mail in an enclosed fuselage cabin with the pilot in an open rear cockpit.

The Model 20 Consolidated Fleetster was introduced in 1930 as an adaptation of the Model 17 to meet the needs of contractors operating under the McNary-Watres Act. It incorporated a 60 cubic foot mail and express compartment immediately aft of the firewall, entirely closed off and locked from the passenger compartment which accommodated five persons. The pilot sat in an open rear cockpit, and the monoplane wing was raised 18 inches above the monocoque metal fuselage to provide him with good vision. It was powered with a Pratt and Whitney Hornet or a Wright Cyclone engine, using an N. A. C. A. cowling to permit it to cruise at 150 miles an hour for 500 miles with a net pay load of 1,700 pounds.

EMSCO "FLYING WING"

Huge Emsco low wing monoplane of the "flying wing" type, powered with a Wasp Jr. engine, is designed for 70 hours of continuous flying.
The Fokker F-14, introduced in 1929 when the McNary-Watres Bill was under consideration, carried six passengers in a cabin with a special compartment for mail and express, while the pilot was placed in an open rear cockpit. The parasol type wing was similar to that of the Fleetster in that the monoplane wing was raised above the fuselage to give the pilot better vision. The F-14 was powered with either a Pratt and Whitney Hornet or a Wright Cyclone engine. It had a cruising speed of 140 miles an hour with a full load.

The Northrop Alpha, an all-metal, low-wing, seven place monoplane powered with a Pratt and Whitney Wasp engine, represented one of the most interesting new designs of the year. It had a multi-cellular wing on which the metal skin took the tension and compression beam loads. Shear loads were taken through vertical members. The fuselage was an all-metal monocoque stressed skin structure in which formed gores ran longitudinally and stiffening rings were spaced transversely at various intervals. All control surfaces were similar in construction to the wing. Six passengers were accommodated in the monocoque fuselage cabin and the pilot was placed in an open rear cockpit. The plane was designed for exceptionally fast, light transport.

The "flying wing" type of plane, long the dream of designers as fulfilling the characteristics of aerodynamic efficiency strived for in all
airplanes, attracted considerable attention during 1930 among designers and engineers of the Northrop Aircraft Corporation, the newest unit of United Aircraft and Transport Corporation. A small experimental plane of 30-foot wing span was built and flown during the year. The results of the tests indicated that the type has considerable promise. It was a pusher type, with the propeller mounted behind the wing, and the tail surfaces carried on outriggers running from the wing. The wing was very heavily tapered from root to tip, the root being so thick that the small nacelle in which the crew and engine were placed was practically hidden in the wing.

While referred to popularly as a “flying wing,” the Fokker XO-27, a new type observation-reconnaissance plane built for the Army Air Corps, was really of conventional design except that its two Curtiss Conqueror engines were faired into the thick monoplane wing, the landing gear folded into pockets beneath the engines, and the nose of the fuselage extended out further than the usual ship. Of metal construction, it had a high cruising speed and represented a distinct advance in the development of military observation planes for specific purposes. It carried a crew of three and was designed to penetrate deep into enemy territory on photographic missions, carrying machine guns to protect itself in flight.

There were no completely new designs introduced in the multi-motored transport field during 1930. The Stinson Aircraft Corporation took over the Corman tri-motored 11 place design and placed it in production with some refinements. It was powered with three Lycoming engines. The Fokker F-32, the largest land plane produced in the United States; the Consolidated Commodore, the largest flying boat in the country; the Curtiss Condor; Fokker F-10A; Ford 5-AT-C; and Sikorsky S-41 were continued in production as super-transports. All being developments of 1929, they were described extensively in “The Aircraft Year Book for 1930” and have been described briefly in the earlier chapter of this book on aircraft manufacturing.

Mystery Ship Dominates Speed Field

Probably because manufacturers sought to make their new models carry a pay load which would pay the bills for operation, no new design introduced during the year surpassed the performance of the Travel Air Mystery Ship, introduced in 1929 and produced during 1930 as high speed sport jobs. Powered with a Wright Whirlwind 300 engine, the Mystery Ship held all transcontinental speed records and hung up many shorter distance speed marks during the year. These record performances have been discussed in detail in an earlier chapter. It is sufficient to say that many engineers attributed the year’s trend toward low-wing streamlined monoplanes to the early success of this Travel Air model, which consistently attained
speeds well in excess of 200 miles an hour. The Laird LC-DW 300 was a good example of the efficient use of the Pratt and Whitney Wasp Jr. engine introduced early in 1930. A single place biplane especially designed for racing, it won the high speed Thompson Trophy race in Chicago.

The Detroit Aircraft Corporation sought to turn its high speed Lockheed Sirius design to economic advantage during 1930 when it constructed the Detroit Lockheed Sirius Mail Plane on the same basic design with the use of a metal monocoque fuselage and the incorporation of a large mail compartment in the forward part of the ship. Utilizing the advantages of metal construction, the company also introduced its Detroit Lockheed Vega with a metal monocoque fuselage. Weighing only 30 pounds more than the wood fuselage, the metal ship’s performance was approximately the same as that of the earlier design.

Monocoque box type beam construction was incorporated in the metal monoplane wing of the Thaden T-4, a new development in the employment of metal with a view toward low production cost, ruggedness and light weight. It consisted of laterally disposed tapered corrugated sheet in the form of a box, shaped to the contour of the wing and covered both top and bottom with a layer of longitudinally disposed corrugated sheet. The fuselage also was of metal monocoque construction, consisting of a shell of corrugated skin supported internally by a series of tubular duralumin frames.

**New Light Planes Developed**

Perhaps no development of the year was watched closer by manufacturers catering to the private flyer market than the design of very light airplanes with power plants of from 30 to 50 horsepower. The flights of these little ships, carrying one or two passengers at speeds up to 70 and 80 miles an hour, certainly marked a distinct advance in efficiency when their pay load to horsepower ratio was considered. These planes were designed to sell from $800 to $1,500 and could be flown after about five hours instruction. The Aeronca C-2, a single place light monoplane powered with a 30 horsepower Aeronca engine, was the pioneer in this field, introduced early in 1930. It was to be followed in 1931 by the Aeronca C-3, a two place side-by-side dual control monoplane of similar construction. It was demonstrated that a solo flight could be made in the new ship after 20 minutes dual instruction, and its manufacturers estimated that a five hour course costing no more than $50 would be the maximum instruction needed. Dealers were to include a solo course with the cost of the ship. The Aeronca C-2 was flown during 1930 from Cincinnati to Boise, Idaho, 2,500 miles, at a cost of $16.50 and from Cincinnati to New York at a cost of $8.20, including gas, oil and any necessary mechanical adjustments.

The American Eaglet also made its debut in this field during the year
as an open cockpit monoplane carrying one or two persons depending upon the power plant used. It was offered with either a Cleone or Szekely engine. Cessna successfully flew a small two place monoplane powered with a Continental engine during the year, and Curtiss-Wright, Huntington and Waco had similar designs in the experimental stage. The Curtiss-Wright Junior was a two place monoplane with a 40 horsepower engine. Several other companies were reported to have light airplane designs on their drafting boards, but no other ships in this class were test flown during 1930. It was a development which was to reach its full stature by the summer of 1931 and many engineers watched the results of these pioneering models with keen interest.

**Flying Boats and Amphibians**

General use of the nation's natural airways—rivers, lakes, bays, and seas—by aircraft still remained to be achieved. Interest in flying boats, seaplanes and amphibians for commercial and private use continued to grow, but the surface of the potential field had barely been scratched. Development during 1930 was principally concerned with the refinement of models in production or the manufacture of larger types based on experience of smaller ships of similar design. Amphibians, Inc., formerly Ireland Aircraft, Inc., introduced the Privateer, a two-place side-by-side open cockpit amphibian monoplane powered with a Warner Scarab engine, to supplement their standard line of amphibians and flying boats. Harry Rogers designed and successfully flew a new flying boat, powered with a Wright Whirlwind 240, which demonstrated excellent flying characteristics. Carrying a pilot and four passengers, it had a high speed of 105 miles an hour, took off in a dead calm in 16 seconds, and climbed at the rate of 740 feet per minute. The Towle TA-3, a high wing cabin monoplane amphibian powered with two Packard Diesel engines, received an Approved Type Certificate. It was to be placed in production early in 1931.

The Sikorsky Aviation Corporation, a division of United Aircraft and Transport Corporation, had the S-40, a new 41 passenger commercial amphibian under construction. Scheduled to be launched in 1931 for South American air transport service, it was to be the world's largest amphibian. With a wing span of 114 feet and an overall length of 72 feet 11 inches, it was designed to carry a useful load of 11,250 pounds. It was to be of all metal construction, powered with four Pratt and Whitney Hornet engines mounted abreast below the monoplane wing, and designed for a high speed of 129 miles an hour, a cruising speed of 108 miles an hour, and a 900 mile flying range without refueling. It was to be equipped with a retractable landing gear. Sikorsky brought out the S-41, a twelve
place monoplane, as a successor to the S-38, a ten place sesqui-plane. The S-39, a four place all metal monoplane amphibian powered with a Pratt and Whitney Wasp Jr. also was placed in production during the year. Fokker, Keystone and Boeing continued their standard marine models in production.

In the flying boat field, Consolidated completed construction of its fourteenth giant Commodore for South American service. Twelve were produced to accommodate 22 passengers and two were enlarged for 30 passengers, besides a crew of three. The Dornier DO-X, the world’s largest flying boat, remained an unknown quantity at the end of the year, although some engineers looked upon it as the logical development to solve the problems of trans-oceanic air transportation. Its trans-Atlantic flight projected for 1931 was looked upon as an opportunity for the big ship to prove its economic value.

**Autogiros for Commercial Market**

Engineers generally agreed that the Autogiro, while not strictly a development of 1930, made the outstanding contributions of the year to the advancement of aeronautic design, outside the conventional field. Several American-built Autogiros, constructed for experimental purposes by the Pitcairn-Cierva Autogiro Company, were operated throughout the year and several outstanding refinements in their design achieved. The Autogiro, invented by Juan de la Cierva, converts all the functions of fixed wing flight into moving wing flight in the same way that boat propellers utilize the propulsive principles of the oar. Four vanes revolving around the mast and turned by the force of the air stream bear the burdens of lift. They make possible take-offs in short distances and landings in even smaller areas. The Autogiro is able to retain flying speed after its power is cut off, making landings possible at a steeper angle with a minimum forward speed. Probably the most important technical advance of the year on the Autogiro was the starting of the rotor vanes directly from the engine. A clutch enabled the pilot to use the engine to set the vanes in motion on the ground so that a take-off could be made without a long period of taxiing. The clutch was released as soon as the machine was in the air and the normal slip stream kept them in motion. The Pitcairn-Cierva organization announced its readiness to permit production of the Autogiros for the commercial market late in 1930, and several companies prepared to manufacture them in 1931.

**Helicopter in Hangar Tests**

The Curtiss-Bleecker helicopter, shown to the public for the first time in 1930, attracted considerable attention among aeronautical engineers
although it remained an unknown quantity at the end of the year. Flight tests of the machine were scheduled for 1931. It had been hopped off the ground in the still air of its hangar several times, but engineers in charge of the project were not yet ready for flight tests. Resembling the Autogiro somewhat in outward appearance, the helicopter had one apparent fundamental difference in that its wings were propelled by the pull of its propellers, while the Autogiro obtained its forward motion in the air from the forward motion of the machine. The Curtiss-Bleeker machine consisted of four large wings or blades, mounted at right angles to one another and revolving in a horizontal plane. The wings were revolved by propellers, one to each wing, mounted forward of the leading edge, about two-thirds of the way out. The propellers were driven through a gear and shaft arrangement from one central Pratt and Whitney Wasp engine, mounted horizontally. To each of the wings were attached outrigger booms mounting small elevators or tail surfaces. Thus, each unit was in reality a small airplane, consisting of a power driven wing with a tail which can control the angle of incidence of the wing at any point. Beneath the four wings was suspended a small fuselage in which the crew was located.

Safety Devices and Navigation Instruments

“Slots,” “flaps” and “floating ailerons,” fundamental changes in wing design which received marked attention during 1929 in the Guggenheim Safe Aircraft Competition, were conspicuous by their absence from models during 1930. Only one commercial model in production offered the purchaser “slots” as optional equipment. The Curtiss Company considered adapting its “floating aileron” to standard commercial models early in the year, but held up its plans temporarily due to the necessity for conserving resources. Some designers considered these devices “just so many more gadgets to be kept in working order,” while others felt they offered a distinct aerodynamic advantage which would be realized at a future time when manufacturers are inspired by a more ready market for their products.

All aircraft incorporated a certain degree of stability in their design which made them easy to fly, and designers generally agreed that it would be a mistake to make the present airplane more stable. Many engineers looked upon the development of mechanical control to relieve the pilot as an important step in improving the system of airplane control. With mechanical devices operating the controls, the pilot would be left free to attend to his navigation tasks and to keep a closer check of the operation of his power plant. Full automatic mechanical control has been applied to steamships and many engineers believed such control was certain to be adopted for transport airplanes in the near future. More than 50 hours of flight tests, including several long distance flights, were made during
the year by the Army Air Corps with the gyroscopic stabilizer or "robot" developed by the Sperry Gyroscope Company. It automatically compensated for lateral, longitudinal or horizontal changes in flight through a system of electro-magnets. The mechanically controlled airplane could be given nearly neutral stability in design so that it would be much less affected by momentary changes in the direction of the relative wind, adding to the passengers' comfort and the pilot's ease of operation. Several transport lines planned to employ the "robot" on their planes experimentally during 1931.

Instrument flying became increasingly important during 1930 as transport schedules were maintained and private fliers used their planes more extensively over extended areas in all kinds of weather. The Pioneer Instrument Company, a division of Bendix Aviation Corporation, introduced its new Straightway magnetic compass, used by more than half of the planes on the National Air Tour. Its features were steadiness and ease of reading. By use of parallel lines, the necessity for continually observing numbers on a dial was eliminated. After the pilot set his course by turning the top ring so the desired course coincided with the triangular reference mark, it was only necessary to keep the top wires parallel with those below.

The Gyro Horizon, an artificial horizon instrument perfected by the Sperry Gyroscope Company, was considered an important contribution to "blind flying." Weighing less than four pounds, this unimposing instrument enabled pilots to fly through fog, clouds or darkness in safety by showing the relative position of the plane with the horizon at all times, although the natural horizon could not be seen.

Radio continued to play an important part in the safe navigation of aircraft in all kinds of weather. Two-way voice communication was maintained on most of the transport planes flying the scheduled air lines, and most planes were equipped with radio sets to receive weather reports in flight. The radio beacons, both aural and visual types, were proving a distinct aid to regular navigation. Development of the visual reed indicator, produced by Julien P. Friez and Sons, was accomplished during the year for commercial use. The instrument provided the pilot with a visual check of his course at all times, day and night. Used in connection with the beacon system maintained by the Department of Commerce, the instrument indicated the course through two vibrating reeds, the relative amplitudes of which showed the position of the airplane in relation to the beacon course. Equal amplitude of the two reeds indicated that the plane was on its course. The company also developed a complete set of accurate weather instruments for use at airports and by weather bureaus for obtaining aviation weather data.

The importance of keeping instruments accurate at all times prompted
the Aircraft Control Corporation, a division of the Bendix Aviation Corporation, to develop a complete line of testing equipment for airplane instruments. The three most important perfected were the thermometer tester, altimeter tester, and pressure gauge tester. Others included an airspeed indicator tester, bank and turn indicator tester, and tachometer tester. The Motor Vita, an instrument invented by Dr. Miller Reese Hutchison, was successfully tried out during the year and arrangements made for its manufacture. This instrument indicated through a gauge on the instrument board the composition of the gas mixture passing through the engine and provided means whereby air could be introduced into the intake manifold sufficiently to make perfect combustion, eliminating carbon monoxide and at the same time increasing the efficiency of the fuel from 20 to 40 per cent. The instrument was used by Capt. Frank Hawks in his Mystery Ship and the range of the plane was increased about 40 per cent.

Power Plant Development

The trend in engine development during the year was toward higher performance and consequent lower operating costs. In most cases this was achieved through refinements of design, rather than by the development of
With a cruising speed of 150 miles an hour, the Northrop Alpha (Pratt and Whitney Wasp) is the first all-metal low wing cabin monoplane in America.

New Boeing 80B, super transport biplane powered with three Pratt and Whitney Hornet engines, is equipped with an open pilot's cockpit for the first time.
any distinctly new type of power plant. The Packard Diesel and Pratt and Whitney fuel injection engines were the only distinctly new types introduced. There also was a marked degree of progress in the low horsepower field, where engines were developed to power new light airplanes built or under construction.

Engines of higher output were offered for commercial use, although a year or two before they could only have been used for racing, military operations or special purposes. In all these engines, the weight-horsepower ratio was reduced by continued “stepping up” of power. The usual procedure to effect the power increase was through supercharging, operating at greater crankshaft speeds, improving cylinder head and spark plug cooling, and using higher compression ratios. Higher cylinder temperatures for higher thermal efficiency also were permitted with both liquid-cooled and air cooled engines. These engines necessarily required a relatively higher grade of fuel and lubricating oil, because of the necessity of preventing detonation, and because of higher bearing pressures and cylinder temperatures.

Inability of fliers to obtain fuel of uniform specification, when making cross country flights, retarded refinements in commercial engine design with a resulting loss of possible power estimated at from 15 to 20 per cent. and an increase in fuel consumption of at least 10 per cent. It was considered necessary to the future development of commercial aeronautics that aviation fuels, held to uniform standards with unmistakable grading labels, be made available over wide territories. The year saw definite progress toward this goal made by the petroleum industry. As an example, the Stanavo Specification Board, Inc., formed by the Standard Oil Company of California, Standard Oil Company of Indiana and the Standard Oil Company of New Jersey, brought out during the year Stanavo gasoline in addition to its previously announced Stanavo Oil. Its object was to make aviation gasoline and oil of uniform analysis available under an identical brand in all parts of the world.

The Curtiss Aeroplane and Motor Company concentrated its attention during the year on the chemical cooling of its 600 horsepower Curtiss Conqueror. The new cooling increased the efficiency of the engine and reduced head resistance and weight by effecting a three-fourths reduction in the size of the radiator. The Prestone cooled Conqueror passed all of its government tests and was adopted as standard.

Fairchild Engine Corporation, a division of the Aviation Corporation, obtained an Approved Type Certificate during the year on a six cylinder inverted in-line air cooled engine known as the Fairchild 6-390, with a rating of 120 horsepower at 2,150 revolutions per minute. Experimental development of a 12 cylinder inverted vee engine with the same cylinders also was undertaken.
Packard Motor Car Company introduced the only distinctly new type engine for the commercial field during 1930, the Packard Diesel. Operating on ordinary furnace oil, the engine completed the 4,935 miles of the National Air Tour, averaging 11.3 miles per gallon of fuel. It weighed 520 pounds and was rated at 225 horsepower at 1,950 revolutions per minute. It had no carburetor, magneto or spark plugs. Ignition was obtained by spraying fuel into air, compressed in the cylinders until it reached a temperature of about 1,000 degrees Fahrenheit. Because of its simplicity of design and construction, it could be disassembled in 17 minutes. First engines of the new type could be distinguished at any airport by a plume of smoke rising from them during a take-off, climb or other full throttle operating conditions. Means of reducing the smoke to a volume no greater than the conventional gas engine were found and incorporated into the design.

Pratt and Whitney Aircraft Company, a division of United Aircraft and Transport Corporation, perfected a device which eliminated the usual carburetor and intake system of the gasoline engine. A Boeing fighter powered with a stock model Wasp, with the fuel injection device attached, was successfully flown in April and experimentation continued throughout the year. The new injection system measured the fuel precisely and delivered it mechanically to each cylinder. Atomization was so perfect that a large range of fuels from furnace oil to aviation gasoline could be used. The system developed greater power with gasoline and provided perfect operation regardless of temperature of the engine or its position in the air. Cold starting was facilitated and trouble encountered as the result of ice forming on the carburetor was eliminated. Several engines using the device were put into service on the transport lines for tests. Early in the year, a standard nose cowl and a combined exhaust collector and air stove were made available for the Wasp Jr., offered to the commercial market in January. It was designed to decrease the drag of the engine and at the same time provide ample hot air for the carburetor under extremely cold operating conditions. The power output of engines in production, reviewed in the chapter “Producing American Engines,” was increased through supercharging and use of higher compression ratios.

Wright Aeronautical Corporation, a division of the Curtiss-Wright Corporation, introduced a new model of its Cyclone series, the R-1820-E. It was rated at 575 horsepower as compared with 525 horsepower of the R-1750-E, and developed well over 600 horsepower at the normal 1,900 revolutions per minute. Temperature reduction over any other pre-existing models was accomplished by refinements in design of the cylinder head, ingenious spark plug coolers, and by air deflectors which properly directed the air around the cylinder head and barrel. The marked decrease in the temperature of the heads and in the spark plug area reduced, to a large
extent, any tendency of distortion in the cylinders. The supercharger centrifugal clutch was incorporated on all standard Whirlwind and Cyclone engines. The chief advantages of the clutch resulted through increasing the reliability of the engines by decreasing the shock on the teeth of the supercharger gears and in easing the strain on the entire unit. The new Cyclone developed nearly three times the power of Lindbergh’s trans-Atlantic Whirlwind with only a 60 per cent. increase in weight. The average cylinder head temperatures of the new Cyclone was about 375 degrees Fahrenheit as compared to 575 degrees of the Lindbergh engine.

“ROBOT” PILOTS PLANE

Lieut. Marion Huggins (left) and Elmer A. Sperry, Jr., inventor (right), holding the two gyroscopes which piloted an Army bomber with greater accuracy than the best trained pilot.

It was demonstrated that 400 horsepower with 975 cubic inches displacement was practical with reasonably high grade fuels, and brake mean effective pressures as high as 165 pounds per square inch were not dangerous under proper conditions. Air cooled engines had reached a stage where they approximated water-cooled engines in their performance, a marked progress.

The products of other manufacturers in production or in various stages of experimentation also are described fully in that chapter. It might be interesting to point out here, however, that the development in the light airplane field resulted in a complementary stimulation of the low-powered
engine field. The Aeronca, Continental, and Szekely 30 and 40 horsepower engines were illustrative of this trend. Other low horsepower engines were certain to make their appearance during 1931.

**Controllable Pitch Propeller**

The outstanding development in propeller design during 1930 was the perfection of controllable pitch propellers, one by the Hamilton Standard Propeller Corporation, a division of United Aircraft and Transport Cor-

![TWO-WAY COMMUNICATION](image)

*Pilot using the new Western Electric “silencer” type transmitter and phonette headset to talk with ground base while in flight.*

portation and another by the Curtiss Aeroplane and Motor Company, a division of Curtiss-Wright. These new types of propellers, represented an achievement desired for years by leading aircraft and engine designers. In the Hamilton type, the variation in pitch was obtained through an hydraulic adjustment mechanism, built integral with the propeller and controllable from the pilot’s cockpit. The mechanism was operated by means of the motor oil pressure lead to it through the hollow crankshaft. The pilot’s control in the cockpit consisted simply of a two-way valve permitting a flow of oil into the mechanism or away from it. A flow of oil into the mechanism decreased the pitch, and flow of oil out of the mechanism with the aid of centrifugal force returned the pitch to normal
or increased it. It made possible the advantages of low pitch at the take-off and high pitch during level flight and for cruising.

The Curtiss type, perfected by the Curtiss Aeroplane and Motor Company, Inc., in cooperation with W. R. Turnbull, was an electrically controlled, variable pitch propeller. It successfully underwent exhaustive flight tests during the year. A switch on the dashboard operated a motor in the hub of the propeller which through the use of heliocentric gears made the pitch of the blade controllable at will by the pilot without any compli-

cated mechanical connecting devices, electric control being transmitted through contact rings on the hub of the motor from the cockpit.

The important part played in the refinement of component parts for airplane power plants already has been discussed in the chapter “Producing American Engines.” It should be sufficient here to point out that starters, generators, ignition devices, magnetos, superchargers, carburetors, batteries and similar parts manufactured by specialists all played their part in improving the efficiency of the present day engine.

The Society of Automotive Engineers in cooperation with the Aeronautical Chamber of Commerce made valuable contributions to the technical field during the year by providing a forum of discussion through numerous meetings throughout the country and through the development
of new aircraft and engine standards. New specifications were adopted by the industry on flat-head pins, internal tie rods, pulley spacers, anti-friction bearing pulleys, small size tapered shaft-end and hub, streamline tie rods, extruded aluminum alloy sheets, aluminum and duralumin rivets, and shock absorber strut ends. Important projects under consideration included the further development of the splined shaft-end and hub specifications, propeller hub cones and nuts, and aircraft carburetor flanges.
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MODEL S-55 — 15 PLACE
ENGINE: TWO ISOTTA FRASCHINI
TWO WRIGHT CYCLONE
MULTI-MOTORED TRANSPORTS

BOEING AIRPLANE COMPANY
Seattle, Wash.

MODEL 80-A — 20 PLACE

ENGINE: THREE PRATT & WHITNEY HORNETS
CONSOLIDATED AIRCRAFT CORPORATION
Buffalo, N. Y.

COMMODORE — 22 PLACE
ENGINE: TWO PRATT & WHITNEY HORNETS
MULTI-MOTORED TRANSPORTS

CURTISS AEROPLANE & MOTOR COMPANY
Garden City, L. I., N. Y.
CONDOR — 20 PLACE
ENGINE: TWO CURTISS GEARED CONQUERORS
FOKKER AIRCRAFT CORPORATION OF AMERICA
New York City
MODEL F-32 — 32 PLACE
ENGINE: FOUR PRATT & WHITNEY HORNETS
FOKKER AIRCRAFT CORPORATION OF AMERICA
New York City
Model F-10 — 14 Place
Engine: Three Pratt & Whitney Wasps
FORD MOTOR COMPANY
Stout Metal Airplane Division
Dearborn, Mich.
MODEL 5-AT-C — 15 PLACE
ENGINE: THREE PRATT & WHITNEY WASPS
FORD MOTOR COMPANY
Stout Metal Airplane Division
Dearborn, Mich.

Model 4-AT — 14 Place
Engine: Three Pratt & Whitney Wasp, Jrs.
Three Wright Whirlwind, 300
SIKORSKY AVIATION CORPORATION
Bridgeport, Conn.
Amphibion S-41 — 16 Place
Engine: Two Pratt & Whitney Hornets
SIKORSKY AVIATION CORPORATION
Bridgeport, Conn.
AMPHIBION S-38 — 10-12 PLACE
ENGINE: TWO PRATT & WHITNEY WASPS
STINSON AIRCRAFT CORPORATION
Wayne, Mich.

MODEL SM-6000  11 PLACE
ENGINE: THREE LYCOMINGS
AMERICAN AERONAUTICAL CORPORATION
New York City
Model S 62 — 7 Place
Engine: Isotta Fraschini
BELLANCA AIRCRAFT CORPORATION
New Castle, Del.

PACEMAKER — 6 Place

Engine: PACKARD DIESEL
Pratt & Whitney WASP, JR.
Wright WHIRLWIND 300
BELLANCA AIRCRAFT CORPORATION
New Castle, Del.
SKYROCKET — 6 PLACE
ENGINE: PRATT & WHITNEY WASP
BOEING AIRPLANE COMPANY
Seattle, Wash.

MODEL 204 — 6 PLACE
ENGINE: PRATT & WHITNEY WASP
BUHL AIRCRAFT COMPANY
Marysville, Mich.

Senior Airsedan CA-8 — 8 Place

Engine: Pratt & Whitney Wasp
Pratt & Whitney Hornet
Wright Cyclone
BUHL AIRCRAFT COMPANY
Marysville, Mich.
Standard Airdsman CA-6 — 6 Place
Engine: Wright Whirlwind 300
CONSOLIDATED AIRCRAFT CORPORATION
Buffalo, N. Y.
FLEETSTER — 8 PLACE
ENGINE: PRATT & WHITNEY HORNET
CUNNINGHAM HALL AIRCRAFT CORPORATION
Rochester, N. Y.
P T 6 — 6 Place
ENGINE: WRIGHT WHIRLWIND 300
CURTISS–WRIGHT AIRPLANE COMPANY
Wichita, Kan.

MODEL 6000A–6000B — 6 PLACE
ENGINE: PRATT & WHITNEY WASP
WRIGHT WHIRLWIND 300
DETROIT AIRCRAFT CORPORATION
Detroit, Mich.
DETROIT LOCKHEED METAL VEGA — 7 Place
Engine: PRATT & WHITNEY WASP
FAIRCHILD AIRPLANE MANUFACTURING CORPORATION
Farmingdale, L. I., N. Y.

FAIRCHILD 71 — 7 PLACE
ENGINE: PRATT & WHITNEY WASP
FOKKER AIRCRAFT CORPORATION OF AMERICA
New York City

Universal—Super Universal — 5-7 Place
Engine: Pratt & Whitney Wasp
Wright Whirlwind 300
FOKKER AIRCRAFT CORPORATION OF AMERICA
New York City
F-11-A — 8 Place
ENGINE: PRATT & WHITNEY HORNET
WRIGHT CYCLONE
KEYSTONE AIRCRAFT CORPORATION  
Bristol, Pa.  
Air Yacht — 8 Place  
Engine: Wright Cyclone
SOLAR AIRCRAFT COMPANY, LTD.
San Diego, Cal.
Model MS-1 — 8 Place
Engine: Pratt & Whitney Wasp
BELLANCA AIRCRAFT CORPORATION
New Castle, Del.

AIRBUS — 12 PLACE

ENGINE: CURTISS CONQUEROR
PRATT & WHITNEY HORNET
WRIGHT CYCLONE
MAIL TRANSPORTS

BOEING AIRPLANE COMPANY
Seattle, Wash.
MONOMAIL 221 — 7-9 PLACE
ENGINE: PRATT & WHITNEY HORNET
BOEING AIRPLANE COMPANY
Seattle, Wash.

Model 40 B-4 — 5 Place
Engine: Pratt & Whitney Hornet
MAIL TRANSPORTS

BOEING AIRPLANE COMPANY
Seattle, Wash.
Model 95 — 1 Place
Engine: Pratt & Whitney Hornet
CONSOLIDATED AIRCRAFT CORPORATION
Buffalo, N. Y.

Model 20 — 6 Place
Engine: Pratt & Whitney Hornet
CURTISS AEROPLANE & MOTOR COMPANY, INC.
Garden City, L. I., N. Y.
CARRIER PIGEON II — 1 Place
ENGINE: CURTISS GEARED CONQUEROR
CURTISS AEROPLANE & MOTOR COMPANY, INC.
Garden City, L. I., N. Y.
FALCON MAILPLANE — 1 PLACE
ENGINE: WRIGHT CYCLONE
CURTISS-WRIGHT AIRPLANE COMPANY
St. Louis, Mo.

King Bird — 7-8 Place

Engine: Two Wright Whirlwinds 240
Two Wright Whirlwinds 300
FOKKER AIRCRAFT CORPORATION OF AMERICA
New York City
Model F14 — 7 Place
Engine: Pratt & Whitney Hornet
Wright Cyclone
FORD MOTOR COMPANY
Slout Metal Airplane Division
Dearborn, Mich.
Model 8-A Express — 2 Place
Engine: Wright Cyclone, Geared
NEW STANDARD AIRCRAFT CORPORATION
Paterson, N. J.

Model D27A — 1 Place
Engine: Wright Whirlwind 240
NORTHROP AIRCRAFT CORPORATION
Burbank, Calif.

ALPHA — 5-7 Place
Engine: Pratt & Whitney Wasp
PITCAIRN AIRCRAFT, INCORPORATED

Super Mailwing — 1 Place

Engine: Pratt & Whitney Wasp, Jr.
Wright Whirlwind 240
Wright Whirlwind 300
STEARMAN AIRCRAFT COMPANY
Wichita, Kan.
JUNIOR SPEEDMAIL — 1 PLACE
ENGINE: PRATT & WHITNEY WASP
PRATT & WHITNEY WASP, JR.
WRIGHT WHIRLWIND 300
AERONAUTICAL CORPORATION OF AMERICA
Cincinnati, Ohio
AERONCA C-2, C-3
ENGINE: AERONCA
ALEXANDER AIRCRAFT CORPORATION
Colorado Springs, Colo.

BULLET — 4 Place

ENGINE: WRIGHT WHIRLWIND 165
AMERICAN AERONAUTICAL CORPORATION
New York City
Models S 56-S 56B — 3 Place
Engine: Kinner K 5
Kinner B 5
AMPHIBIONS, INCORPORATED
Garden City, L. I., N. Y.
MODELS N 2B–N 2C — 5–6 PLACE
ENGINE: PRATT & WHITNEY WASP
WRIGHT WHIRLWIND 300
AMPHIBIONS, INCORPORATED
Garden City, L. I., N. Y.
PRIVATEER P-2 — 2 PLACE
ENGINE: WARNER SCARAB
AMERICAN EAGLE AIRCRAFT CORPORATION
Kansas City, Kan.

Model A-129 — 3 Place
Engine: Curtiss OX5
Kinner
AMERICAN EAGLE AIRCRAFT CORPORATION
Kansas City, Kan.
WALLACE TOUROPLANE — 3-4 PLACE
ENGINE: KINNER
WRIGHT WHIRLWIND 165
BIRD AIRCRAFT CORPORATION
Brooklyn, N. Y.
Model "B" — 3 Place
Engine: Kinner K5
COMMANDAIRE, Inc.
Little Rock, Ark.
Model 5 C 3 — 3 Place
Engine: Curtiss Challenger
COMMANDAIRE, Inc.
Little Rock, Ark.

LITTLE ROCKET — 1 PLACE
ENGINE: AMERICAN CIRRUS
CURTISS AEROPLANE & MOTOR COMPANY
Garden City, L. I., N. Y.

FLEDGLING — 2 PLACE
ENGINE: CURTISS CHALLENGER
CURTISS-WRIGHT AIRPLANE COMPANY
St. Louis, Mo.

Robin C 1-C 2 — 3 Place
Engine: Curtiss Challenger
Wright Whirlwind 165
CURTISS-WRIGHT AIRPLANE COMPANY
St. Louis, Mo.
Moth — 2 Place
Engine: Wright Gipsy
CURTISS-WRIGHT AIRPLANE COMPANY
Wichita, Kan.

MODEL M — 1 Place
ENGINE: SUPER CHARGED WRIGHT WHIRLWIND 300
CURTISS–WRIGHT AIRPLANE COMPANY
Wichita, Kan.

Model 4 D  —  3 Place
Engine: Wright Whirlwind 240
Wright Whirlwind 165
DAVIS AIRCRAFT CORPORATION
Richmond, Ind.
Model D — 2 Place
Engine: Kinner
Le Blond
DETROIT AIRCRAFT CORPORATION
Detroit, Mich.
DETROIT LOCKHEED "SIRIUS" — 2 PLACE
ENGINE: PRATT & WHITNEY WASP
DETROIT AIRCRAFT CORPORATION
Detroit, Mich.
DETROIT EASTMAN AMPHIBIAN — 3 PLACE
ENGINE: CURTISS CHALLENGER
DETROIT AIRCRAFT CORPORATION
Detroit, Mich.

DETROIT RYAN C-1 — 4 PLACE

ENGINE: PACKARD DIESEL
PRATT & WHITNEY WASP, JR.
WRIGHT WHIRLWIND 240
DETROIT AIRCRAFT CORPORATION
Detroit, Mich.

MODEL P 1—SPEEDSTER — 3 PLACE

ENGINE: AXELSON
CURTISS OX 5
WRIGHT WHIRLWIND 165
FAIRCHILD AVIATION CORPORATION
Farmingdale, L. I., N. Y.
Model KR 21 — 2 Place
Engine: Kinner
FAIRCHILD AVIATION CORPORATION
Farmingdale, L. I. N. Y.
MODEL KR 34 — 3 PLACE
ENGINE: WRIGHT WHIRLWIND 165
GREAT LAKES AIRCRAFT CORPORATION
Cleveland, Ohio
MODEL 2 T 1-A — 2 PLACE
ENGINE: AMERICAN CIRRUS
HUNTINGTON AIRCRAFT CORPORATION
Bridgeport, Conn.

Model 11 — 2 Place
Engine: Warner Scarab
KEystone aircraft corporation
Bristol, Pa.
Commuter — 4 place
Engine: Wright Whirlwind 300
LINCOLN AIRCRAFT COMPANY, Inc.
Lincoln, Neb.

MODEL PT 1 — 2 PLACE
ENGINE: CURTISS OX 5
KINNER
MERCURY AIRCRAFT, INCORPORATED
Hammondsport, N. Y.
Model T 2 — 2 Place
Engine: Le Blond
MONO AIRCRAFT, INCORPORATED
Moline, Ill.
Monocoupe 90-90J-100-125 — 2 Place
Engine: Kinner B 5
Lambert
Warner Scarab, Jr.
Warner Scarab
MONO AIRCRAFT, INCORPORATED
Moline, Ill.

Monoprep — 2 Place
Engine: Velie
MONO AIRCRAFT INCORPORATED
Moline, Ill.
MONOCOACH — 4 Place
ENGINE: WRIGHT WHIRLWIND 240
MOONEY AIRCRAFT CORPORATION
Wichita, Kan.
MODEL A-1, A-2
ENGINE: KINNER K-5
KINNER B-5
NEW STANDARD AIRCRAFT CORPORATION
Paterson, N. J.

Model D29A–D29B–D31–D32 — 2 Place
Engine: Kinser B 5
Wright Whirlwind 165
NEW STANDARD AIRCRAFT CORPORATION
Paterson, N. J.

Model D28A–D25A–D25B — 5 Place

Engine: Wright Whirlwind 240
Wright Whirlwind 300
NICHOLAS-BEAZLEY AIRPLANE COMPANY, INC.
Marshall, Mo.
Barling NB3-NB4 — 3 Place
Engine: Genet
Lambert
Le Blond
Velie M 5
Warner Scarab, Jr.
SIKORSKY AVIATION CORPORATION
Bridgeport, Conn.
Amphibion S-39 — 5 Place
Engine: Pratt & Whitney Wasp, Jr.
SPARTAN AIRCRAFT COMPANY, INC.
Tulsa, Okla.

Model G 3 — 3 Place
Engine: Wright Whirlwind 165
Wright Whirlwind 240
SPARTAN AIRCRAFT COMPANY, INC.
Tulsa, Okla.
Model C 4-C 5 — 4-5 Place
Engine: Pratt & Whitney Wasp, Jr.
Wright Whirlwind 240
Wright Whirlwind 300
STEARMAN AIRCRAFT COMPANY
Wichita, Kan.

Model C 3R — 3 Place
Engine: Wright Whirlwind 240
STEARMAN AIRCRAFT COMPANY
Wichita, Kan.

CLOUDBOY — 2 Place

ENGINE: CONTINENTAL

PRATT & WHITNEY WASP, JR.

WRIGHT WHIRLWIND 165
STINSON AIRCRAFT CORPORATION
Wayne, Mich.

Model SM 8A — 4 Place
Engine: Lycoming
VERVILLE AIRCRAFT COMPANY
Detroit, Mich.

Model 104 — 4 Place
Engine: Packard Diesel
Wright Whirlwind 240
CHANCE VOUGHT CORPORATION
Hartford, Conn.

Model O 2U-4 — 2 Place
Engine: Pratt & Whitney Wasp
WACO AIRCRAFT COMPANY
Troy, Ohio

MODEL CS 0 — 3 PLACE
ENGINE: WRIGHT WHIRLWIND 165
WRIGHT WHIRLWIND 240
WACO AIRCRAFT COMPANY
Troy, Ohio
Model QS 0 — 3 Place
Engine: Continental A 70
WACO AIRCRAFT COMPANY
Troy, Ohio
Model 225 Taper Wing — 3 Place
Engine: Packard Diesel
Wright Whirlwind 240
WACO AIRCRAFT COMPANY
Troy, Ohio

Model F — 3 Place
Engine: Kinner K 5
Kinner B 5
Warner Scarab
WHITTELSLEY MANUFACTURING COMPANY
Bridgeport, Conn.
WHITTELSLEY AVIAN — 2 Place
ENGINE: CIRRUS
B/J AIRCRAFT CORPORATION
Baltimore, Md.
FIGHTER XFJ-1 — 1 PLACE
ENGINE: PRATT & WHITNEY WASP
BOEING AIRPLANE COMPANY
Seattle, Wash.
FIGHTER F-3—B-1
ENGINE: PRATT & WHITNEY Wasp
BOEING AIRPLANE COMPANY
Seattle, Wash.

Model P 12 C—F 4 B 2
Engine: Pratt & Whitney Wasp
BOEING AIRPLANE COMPANY
Seattle, Wash.
Pursuit X P-7
Engine: Curtiss V-1370
BOEING AIRPLANE COMPANY
Seattle, Wash.
MODEL 218
ENGINE: PRATT & WHITNEY WASP
BOEING AIRPLANE COMPANY
Seattle, Wash.
MODEL 202
ENGINE: PRATT & WHITNEY WASP
BOEING AIRPLANE COMPANY
Seattle, Wash.
MODEL XP-9
ENGINE: CURTISS SUPER CONQUEROR
CURTISS AEROPLANE & MOTOR COMPANY, Inc.
Garden City, L. I., N. Y.
TRAINER N 2 C 2
ENGINE: WRIGHT WHIRLWIND 240
CURTISS AEROPLANE & MOTOR COMPANY, INC.
Garden City, L. I., N. Y.
FIGHTER F 8 C 4—F 8 C 5
ENGINE: PRATT & WHITNEY WASP
MILITARY PLANES

CURTISS AEROPLANE & MOTOR COMPANY, Inc.
Garden City, L. I., N. Y.
Pursuit P 6
Engine: Curtiss Conqueror
CURTISS AEROPLANE & MOTOR COMPANY, Inc.
Garden City, L. I., N. Y.
Pursuit XP-10
Engine: Curtiss Conqueror, Prestone Cooled
CURTISS AEROPLANE & MOTOR COMPANY, Inc.
Garden City, L. I., N. Y.
Pursuit YP-20
Engine: Wright Cyclone
CURTISS AEROPLANE & MOTOR COMPANY, Inc.
Garden City, L. I. N. Y.
OBSERVATION O-1E
ENGINE: CURTISS D-12-E
CURTISS AEROPLANE & MOTOR COMPANY, Inc.
Garden City, L. I., N. Y.
Observation XO-16
Engine: Curtiss Conqueror
CURTISS AEROPLANE & MOTOR COMPANY, Inc.
Garden City, L. I., N. Y.
OBSERVATION Y 10–1 C
ENGINE: CURTISS D–12–E
CURTISS AEROPLANE & MOTOR COMPANY, Inc.
Garden City, L. I., N. Y.

OBSERVATION 020

ENGINE: CURTISS GEARED CONQUEROR, PRESTONE COOLED
CURTISS AEROPLANE & MOTOR COMPANY, Inc.
Garden City, L. I., N. Y.
RACER XF6C-6
ENGINE CURTISS CONQUEROR, PRESTONE COOLED
MILITARY PLANES

CURTISS AEROPLANE & MOTOR COMPANY, Inc.
Garden City, L. I., N. Y.
FIGHTER FSC-7
ENGINE: WRIGHT CYCLONE
CURTISS AEROPLANE & MOTOR COMPANY, Inc.
Garden City, L. I., N. Y.
Bomber B-2
Engine: Two Curtiss Geared Conquerors
DETROIT AIRCRAFT CORPORATION
Detroit, Mich.
Bomber TE-1
Engine: Wright Cyclone
HALL ALUMINUM AIRCRAFT CORPORATION
Buffalo, N. Y.
FIGHTER XFH-1
ENGINE: PRATT & WHITNEY WASP
KEYSTONE AIRCRAFT CORPORATION
Bristol, Pa.
TRAINER NK-1
ENGINE: WRIGHT WHIRLWIND 240
KEYSTONE AIRCRAFT CORPORATION
Bristol, Pa.
Bomber B 3 A
Engine: Two Wright Cyclones
NEW STANDARD AIRCRAFT CORPORATION
Paterson, N. J.
Model NT-1
Engine: Kinner B 5—Wright Whirlwind 165
THOMAS MORSE AIRCRAFT CORPORATION
Buffalo, N.Y.
VIPER PURSUIT
ENGINE: CURTISS CHIEFTAIN
THOMAS MORSE AIRCRAFT CORPORATION
Buffalo, N. Y.
MODEL O-19 C
ENGINE: PRATT & WHITNEY WASP
CHANCE VOUGHT CORPORATION
Hartford, Conn.
Observation O2U-4
Engine: Pratt & Whitney Wasp
MILITARY PLANES

CHANCE VOUGHT CORPORATION
Hartford, Conn.
FIGHTER XF20–1
ENGINE: PRATT & WHITNEY WASP
CHANCE VOUGHT CORPORATION
Hartford, Conn.
FIGHTER FU-1
ENGINE: WRIGHT WHIRLWIND 240
E. W. BLISS COMPANY
Brooklyn, N. Y.
Bliss-Neptune — 400 H.P.
7 Cylinder Radial Aircooled
COMET ENGINE CORPORATION
Madison, Wis.

Comet — 150 H.P.
7 Cylinder Radial Aircooled
CONTINENTAL AIRCRAFT ENGINE COMPANY
Detroit, Mich.
Model A70-2 — 165 H.P.
7 Cylinder Radial Aircooled
CURTISS AEROPLANE & MOTOR COMPANY, INC.
Buffalo, N. Y.

CHALLENGER — 185 H.P.
6 CYLINDER RADIAL AIRCOOLED
CURTISS AEROPLANE & MOTOR COMPANY, INC.
Buffalo, N. Y.

Model D-12 — 485 H.P.
12 Cylinder V Type WATERCOOLED
CURTISS AEROPLANE & MOTOR COMPANY, INC.
Buffalo, N. Y.
Conqueror (Geared) — 600 H.P.
12 Cylinder V Type Watercooled
CURTISS AEROPLANE & MOTOR COMPANY, INC.
Buffalo, N. Y.

Conqueror — 625 H.P.
12 Cylinder V Type Watercooled
FAIRCHILD ENGINE CORPORATION
Farmingdale, N. Y.
Model 6-390 — 120 H.P.
6 Cylinder Inverted in Line Aircooled
KINNER AIRPLANE & MOTOR CORPORATION
Glendale, Calif.
Model K-5 — 100 H.P.
5 Cylinder Radial Aircooled
KINNER AIRPLANE & MOTOR CORPORATION
Glendale, Calif.

Model B-5 — 125 H.P.
5 Cylinder Radial Aircooled
KINNER AIRPLANE & MOTOR CORPORATION
Glendale, Calif.
MODEL C-5 — 210 H.P.
5 CYLINDER RADIAL AIRCOOLED
LYCOMING MANUFACTURING COMPANY
Williamsport, Pa.

Model R-680 — 210 H.P.
9 Cylinder Radial Aircooled
PACKARD MOTOR CAR COMPANY
Detroit, Mich.
Model DR-980 — 225 H.P.
9 Cylinder Radial Aircooled
PACKARD MOTOR CAR COMPANY
Detroit, Mich.
Model 2A-1500 — 600 H.P.
12 Cylinder  Inverted V Type  Watercooled
PACKARD MOTOR CAR COMPANY
Detroit, Mich.

Model 2A-1500 — 600 H.P.

12 Cylinder V Type Watercooled
PACKARD MOTOR CAR COMPANY
Detroit, Mich.

Model 2A-1500 (Geared) — 600 H.P.
12 Cylinder V Type Watercooled
PACKARD MOTOR CAR COMPANY
Detroit, Mich.
Model 2A—2500 H.P.
8 Cylinder V Type Watercooled
PACKARD MOTOR CAR COMPANY
Detroit, Mich.

Model 2A–2500 (Geared) — 800 H.P.
12 Cylinder V Type Watercooled
PACKARD MOTOR CAR COMPANY
Detroit, Mich.

Model 1A-2775 — 1250 H.P.
24 Cylinder X Type Watercooled
PRATT & WHITNEY AIRCRAFT COMPANY
East Hartford, Conn.

Wasp, Jr. — 300 H.P.
9 Cylinder Radial Aircooled
PRATT & WHITNEY AIRCRAFT COMPANY
East Hartford, Conn.

WASP C — 420 H.P.
9 CYLINDER RADIAL AIRCOOLED
PRATT & WHITNEY AIRCRAFT COMPANY
East Hartford, Conn.

HORNET A-1 — 525 H.P.
9 CYLINDER RADIAL AIRCOOLED
PRATT & WHITNEY AIRCRAFT COMPANY
East Hartford, Conn.
HORNET (GEARED) — 525 H.P.
9 CYLINDER RADIAL AIRCOOLED
PRATT & WHITNEY AIRCRAFT COMPANY
East Hartford, Conn.

HORNET 1860 — 575 H.P.
9 CYLINDER  RADIAL  AIRCOOLED
PRATT & WHITNEY AIRCRAFT COMPANY
East Hartford, Conn.
HORNET B (GEARED) — 550 H.P.
9 CYLINDER RADIAL AIRCOOLED
SZEKELEY AIRCRAFT & ENGINE COMPANY
Holland, Mich.

Model SR3-B — 40 H.P.
3 Cylinder Radial Aircooled
SZEKELY AIRCRAFT & ENGINE COMPANY
Holland, Mich.
Model SR5-L — 70 H.P.
5 Cylinder Radial Aircooled
WARNER AIRCRAFT CORPORATION
Detroit, Mich
Scarab, Jr. — 90 H.P.
5 Cylinder Radial Aircooled
WARNER AIRCRAFT CORPORATION
Detroit, Mich.

SCARAB — 110 H.P.
7 CYLINDER RADIAL AIRCOOLED
WRIGHT AERONAUTICAL CORPORATION
Paterson, N. J.
Wright Gipsy — 85 H.P.
4 Cylinder In Line Aircooled
WRIGHT AERONAUTICAL CORPORATION
Paterson, N. J.

WHIRLWIND — 165 H.P.
5 CYLINDER RADIAL AIRCOOLED
WRIGHT AERONAUTICAL CORPORATION
Paterson, N. J.

Whirlwind — 240 H.P.
7 Cylinder Radial Aircooled
WRIGHT AERONAUTICAL CORPORATION
Paterson, N. J.

WHIRLWIND — 300 H.P.
9 CYLINDER RADIAL AIRCOOLED
WRIGHT AERONAUTICAL CORPORATION
Paterson, N. J.

Whirlwind — 400 H.P.
9 Cylinder Radial Aircooled
WRIGHT AERONAUTICAL CORPORATION
Paterson, N. J.

CYCLONE — 525 H.P.
9 CYLINDERS RADIAL AIRCOOLED
WRIGHT AERONAUTICAL CORPORATION
Paterson, N. J.
CYCLONE — 575 H.P.
9 CYLINDER • RADIAL • AIRCOOLED
CHRONOLOGY FOR 1930
CHRONOLOGY FOR 1930

Jan. 6  Curtiss “Tanager” awarded $100,000 prize in the Guggenheim Safe Aircraft Competition.
Jan. 13  W. H. Bowlus establishes American glider record of 6 hrs. 19 min. 3 sec. at San Diego, Calif.
Feb. 11  Pontiac, Mich., Municipal Airport receives first A-t-A rating from Department of Commerce.
Feb. 15-16  Capt. Dieudonné Coste and Jacques Codos establish distance record on a closed circuit with pay load of 2,000 kilograms of 2,036.672 miles at Istres, France. (Breguet 19, Hispano-Suiza motored.)
Feb. 15-16  Capt. Dieudonné Coste and Jacques Codos establish duration record on a closed circuit with pay load of 1,000 kilograms of 18 hrs. 1 min. at Istres, France. (Breguet 19, Hispano-Suiza motored.)
Feb. 15-23  Second Annual International Aircraft Exposition held at St. Louis under auspices of Aeronautical Chamber of Commerce.
Feb. 16  D. S. Zimmerly establishes American altitude record for light airplanes of the third category of 24,974 ft. at St. Louis, Mo. (Nicholas Beazley Barling, Lambert R 266 motored.)
Feb. 17-19  First National Conference on Aeronautical Education held at St. Louis, Mo.
Feb. 18  L. F. Shoenhair establishes speed record for 100 kilometers with pay load of 500 kilograms of 185.49 m.p.h. at Jacksonville, Fla. (Lockheed Vega, Pratt and Whitney Wasp motored.)
Feb. 18  L. F. Shoenhair establishes speed record for 500 kilometers with pay load of 500 kilograms of 171.24 m.p.h. at Jacksonville, Fla. (Lockheed Vega, Pratt and Whitney Wasp motored.)
Feb. 18  Air mail through service inaugurated by New York, Rio and Buenos Aires Line, Inc., between Santiago, Chile, and Miami, Fla.
Feb. 20  L. F. Shoenhair establishes speed record for 100 kilometers with pay load of 1,000 kilograms on a closed circuit of 176 m.p.h. at Jacksonville, Fla. (Lockheed Vega, Pratt and Whitney Wasp motored.)
Feb. 20  L. F. Shoenhair establishes speed record for 500 kilometers with pay load of 1,000 kilograms on a closed circuit of 168.27 m.p.h. at Jacksonville, Fla. (Lockheed Vega, Pratt and Whitney Wasp motored.)
Feb. 20  L. F. Shoenhair establishes speed record for 100 kilometers with pay load of 1,000 kilograms on a closed circuit of 152.70 m.p.h. at Jacksonville, Fla. (Lockheed Vega, Pratt and Whitney Wasp motored.)
Feb. 23-24  W. H. Bowlus establishes American glider record of 9 hrs. 5 min. 27 sec. at San Diego, Calif.
Feb. 24-25  Mid-West Legislative Aviation Conference held at Milwaukee, Wis., under auspices of Milwaukee Chapter of N. A. A.
Feb. 28  George W. Haldeman establishes altitude record for commercial planes of 30,453 ft. at Wilmington, Del. (Bellanca Pacemaker, Wright Whirlwind motored.)
Mar. 4  Capt. Boris Sergievsky establishes seaplane altitude record with pay load of 2,000 kilograms of 19,065 ft. at North Beach, N. Y. Sikorsky S-38, 2 Pratt and Whitney Hornets.)
Mar. 6-15  Second Annual Pittsburgh Aircraft Show held at Pittsburgh, Pa.
Mar. 10  Elinor Smith establishes women’s altitude record of 27,418 ft. at Valley Stream, Long Island, N. Y. (Bellanca Pacemaker, Wright Whirlwind motored.)
Mar. 13  Capt. Boris Sergievsky establishes seaplane altitude record with pay load of 500 kilograms and of 1,000 kilograms of 23,222 ft. at North Beach, N. Y. (Sikorsky S-38, 2 Pratt and Whitney Hornets.)

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Capt. Boris Sergeievsky establishes seaplane speed record for 100 kilometers with pay load of 2,000 kilograms of 105.73 m.p.h. at North Beach, N. Y. (Sikorsky S-38, 2 Pratt and Whitney Hornets.)

Capt. Boris Sergeievsky establishes seaplane speed record for 100 kilometers with pay load of 2,000 kilograms of 143.77 m.p.h. at North Beach, N. Y. (Sikorsky S-38, 2 Pratt and Whitney Hornets.)

Second Annual Buffalo Aviation Show held at Buffalo, N. Y.

W. J. Fleming establishes speed record for 100 kilometers with pay load of 2,000 kilograms on a closed circuit of 142.66 m.p.h. at Los Angeles, Calif. (Bach, Pratt and Whitney Wasp and 2 Wright J-6 motors.)

Cincinnati Aircraft Show held at Cincinnati, Ohio.

Capt. Frank M. Hawks is towed in a glider by a Waco plane from San Diego, Calif., to New York, 2,860 miles in 30 hrs. 47 min. flying time.

William Alexander, pilot, Capt. L. A. Yancey, navigator, and Zeh Bouck, radio operator, reach Bermuda from New York, after spending the night on the sea sixty miles from Bermuda. (Stinson, Wright Whirlwind motorized.)

Third Annual All-American Aircraft Show held at Detroit, Mich.

Orville Wright receives first Daniel Guggenheim Medal for aeronautics.

Jean Mermoz establishes seaplane distance record on a closed circuit of 2,677 miles at Marignanc, France. (Latécoère 28, Hispano-Suiza motored.)

Election of officers of Aeronautical Chamber of Commerce.

Tri-State Aircraft Show held at Camden, N. J.

Colonel and Mrs. Charles A. Lindbergh make one-stop flight from Los Angeles to New York in 14 hrs. 43 min. 32 sec. elapsed time, or 14 hrs. 23 min. 27 sec. flying time, establishing unofficial transcontinental record. (Lockheed Sirius, Pratt and Whitney Wasp motorized.)

Direct air mail service inaugurated by Pan American Airways, Inc., between Miami, Fla., and Cristobal, C. Z.

First International Conference on Aviation Lighting held in Berlin, Germany.

McNary-Watres Act signed by President Hoover.

Jack Barstow establishes unofficial gliding record of 15 hrs. 13 min. at San Diego, Calif.

New York Glider Carnival held at Bayside, Long Island, N. Y., under auspices of National Glider Association and Aeronautical Chamber of Commerce.

Lena Bernstein establishes duration record for women of 35 hrs. 46 min. at Le Bourget, France. (Farman 192, Salmon motorized.)

New York Aircraft Salon held at Madison Square Garden under auspices of Aeronautical Chamber of Commerce.

Air mail service extended from Cristobal, C. Z., to Puerto Cabella, Venezuela, by Pan American Airways, Inc.

Dr. Ludwig Prandtl receives second Daniel Guggenheim Medal for work in aerodynamics.

Jean Mermoz, with Jean d'Abry and Leopold Gimie fly from Senegal to Natal, Brazil, establishing distance record for seaplanes of 1,971.7310 miles. (Latécoère 28, Hispano-Suiza motorized.)

N. A. C. A. conference held at Langley Field, Va.

Second National Airport Conference held at Buffalo, N. Y., under auspices of Aeronautical Chamber of Commerce.

Amy Johnson completes solo flight of 9,000 miles from England to Australia. (DeHavilland Moth, DeHavilland Gipsy motored.)

Cheney award for valor presented to Second Lieut. W. A. Matheny of the Army Air Corps.

Col. Roscoe Turner flies from New York to Los Angeles in total elapsed time of 18 hrs. 43 min. 34 sec., setting new record for east-west flight. (Lockheed Vega, Pratt and Whitney Wasp motorized.)
May 28
Clarence O. Prest establishes speed record for light airplanes of the fourth category for 100 kilometers of 100.79 m.p.h., San Bernardino Co., Calif. (Prest Baby Pursuit, Siekelly motor.)

May 30
Glenn H. Curtiss flies from Albany to New York in commemoration of 1910 flight.

May 30–June 2
Maj. U. Maddalena and Lieut. F. Cecconi establish world duration record on a closed circuit of 67 hrs. 13 min. at Montecelio, Rome, Italy. (Savoia-Marchetti S-54, Fiat A 22 T motor.)

May 31
Maj. U. Maddalena and Lieut. F. Cecconi establish world distance record on a closed circuit of 5,088.27 miles at Montecelio, Rome, Italy. (Savoia-Marchetti S-54, Fiat A 22 T motor.)

Curtiss Marine Trophy Race won by Capt. Arthur H. Page at 164.1 m.p.h. at Anacostia, D. C. (Curtiss Hawk, Curtiss D-12 motor.)

June 1
Collier Trophy for 1929 awarded to N. A. C. A. for development of cowling.

June 4
Apollo Soucek establishes world altitude record of 43,166 ft., at Anacostia, D. C. (Wright Apache, Pratt and Whitney Wasp motor.)

June 6
Graf Zeppelin ends 18,000 mile voyage of 19 days from Friedrichshafen, Germany, including Rio de Janeiro and New York.

June 8–13
Annual F. A. I. conference held at Paris, France.

June 11
F. A. I. medal for 1929 awarded to Capt. Dieudonne Coste for record flights.

June 11–July 4
John and Kenneth Hunter establish refueling duration record of 553 hrs. 41 min. 30 sec. at Chicago. (Stinson, Wright Whirlwind motor.)

June 15
Capt. Boris Sergievsky establishes seaplane altitude record with pay load of 500 kilograms of 26,368 ft. at North Beach, N. Y. (Sikorsky S-38, 2 Pratt and Whitney Wasp.)

June 16
Eimer A. Sperry, inventor and founder of Sperry Gyroscope Company, dies at Brooklyn, N. Y.

June 17–18
W. S. Brock and E. F. Schlee fly from Jacksonville to San Diego in 13 hrs. 56 min. and from San Diego to Jacksonville in 16 hrs. 56 min. Round trip elapsed time 31 hrs. 57 min. (Lockheed Vega, Pratt and Whitney Wasp motor.)

June 19
Rear Admiral Richard E. Byrd arrives in New York from antarctic expedition.

June 20–21
Dedication of Randolph Field, Army Air Corps field at San Antonio, Texas.

June 21
Col. R. Fierro flies from New York to Mexico City in approximately 16½ hrs. (Lockheed Sirius, Pratt and Whitney Wasp motor.)

June 22
Son is born to Col. and Mrs. Charles A. Lindbergh.

June 23–26
Maj. Charles Kingsford-Smith, with Evert Van Dyke, John W. Stannage, and Capt. J. P. Saul, in Southern Cross flies from Ireland to New York with stop at Newfoundland for refueling. (Fokker, 3 Wright Whirlwinds.)

Aeronautical Chamber of Commerce gives dinner in honor of Rear Admiral Richard E. Byrd.

June 25
Amelia Earhart sets speed record for women over 100 kilometer course of 174.9 m.p.h. at Detroit, Mich. (Lockheed Vega, Pratt and Whitney Wasp motor.)

June 28–July 6
Pacific Coast Aeronautical Exposition held at Oakland, Calif.

June 29
Roger Q. Williams, with Capt. Errol Boyd and Lieut. H. P. Connor, flies from New York to Bermuda and return without stopping in 17 hrs. 1 min. (Bellanca, Wright Whirlwind motor.)

July 2–4

July 4–6
National Elimination Balloon Race won by Goodyear VII, flying 768 miles, and piloted by R. J. Blair and F. A. Trotter.

July 5
King's Cup Race won by Winifred Brown at Hanworth, England, at 102 m.p.h. (Avro Avian, Cirrus Mark III motor.)
Amelia Earhart sets speed record for women over 3 kilometer course of 181.18 m.p.h. at Detroit, Mich. (Lockheed Vega, Pratt and Whitney Wasp motored.)

Meeting of Committee on Cooperation between Civil Aviation Undertakings of League of Nations held at Geneva.

Ruth Alexander sets altitude record for light planes at San Diego of 21,990 ft. (Nicholas Beazley Darling, Warner motored.)

Fritz Morzik wins International Light Plane Tour. (B. F. W., Argus motored.)

Capt. Boris Sergievsky establishes seaplane altitude record with pay load of 1,000 kilograms of 20,920 ft. at Bridgeport, Conn. (Sikorsky S-38, Pratt and Whitney Wasps.)

Cirrus All-America Flying Derby won by Lieut. Lee Gehlback. (Command-Aire, Cirrus motored.)

Dale Jackson and Forest O'Brine establish refueling duration record of 647 hrs. 28 min. 30 sec. (Curtiss Robin, Curtiss Challenger motored.)

Glenn H. Curtiss dies at Buffalo, N. Y.

Chance M. Vought dies at Southampton, Long Island, N. Y.

R-100 flies from Cardington, England, to Montreal, Canada, in 78 hrs. 49 min.

Florence Barnes establishes speed record for women of 196.19 m.p.h. at Los Angeles, Calif. (Travel Air, Wright motored.)

Capt. Frank M. Hawks flies from New York to Los Angeles in 14 hrs. 50 min. 43 sec. elapsed time, setting new record for east-west flight. (Travel Air Mystery S, Wright Whirlwind motored.)

W. B. Atwater establishes solo duration record for light seaplanes of 22 hrs. 16 min. 32 sec. at Manhasset Bay, N. Y. (Savioia-Marchetti. Kinner motored.)

International Gliding Meet held under auspices of Rheon-Rossitten Gesellschaft at Wasserkuppe, Germany.

Capt. Boris Sergievsky establishes seaplane altitude record with pay load of 2,000 kilograms of 18,928 ft. at Bridgeport, Conn. (Sikorsky S-38, Pratt and Whitney Wasps.)

Capt. Frank M. Hawks flies from Los Angeles to New York in 12 hrs. 25 min. 3 sec. elapsed time or 11 hrs. 40 min. 30 sec. flying time, setting new record for west-east flight. (Travel Air Mystery S, Wright Whirlwind motored.)

R-100 flies from Montreal, Canada, to Cardington, England, in 57 hrs. 5 min.

First National Legislative Air Conference held at Chicago, Ill.

National Air Races held at Chicago, Ill.

Robert Kronfeld establishes glider distance record of 101 miles at Wasserkuppe, Germany.

Capt. Wolfgang von Cronau, with Fritz Albrecht, Franz Hack and Edward Zimmer, arrives at New York, having left the Isle of Sylt, North Sea, on Aug. 18, with stops at Faroe Islands, Iceland, Greenland, Labrador, and Nova Scotia. (Dornier Wal, B. M. W. motored.)

Capt. Dieudonné Coste and Maurice Bellonte complete first non-stop flight from Paris to New York, covering 4,030 miles in 37 hrs. 18 min. 30 sec. (Breguet 19, Hispano-Suiza motored.)

Fifth International Air Congress meets at The Hague, Holland.

Gordon Bennett Balloon Race won by W. T. Van Orman in Goodyear VIII, flying 542 miles from Cleveland to Norfolk County, Mass.

Maryse Bastie establishes duration record for women of 37 hrs. 55 min. 43 sec. at Le Bourget, France. (Klemm, Salson motored.)

American Legion Air Meet held at Philadelphia, Pa.

Sixth Annual National Air Tour won by H. L. Russell. (Ford, Wright and Pratt and Whitney motored.)

Capt. Dieudonné Coste and Maurice Bellonte make 15,000 mile goodwill tour of the United States.
National soaring contest held at Elmira, N. Y., under auspices of National Glider Association.

Middle Atlantic States Traffic and Aviation Conference held at Philadelphia, Pa., under auspices of Chamber of Commerce of the United States and Aeronautical Chamber of Commerce.

New England States Traffic and Aviation Conference held at Boston, Mass., under auspices of Chamber of Commerce of the United States and Aeronautical Chamber of Commerce.

Daniel Guggenheim dies at Port Washington, Long Island, N. Y.

Leroy Manning establishes speed record for 100 kilometers with pay load of 2,000 kilograms at 164.43 m.p.h. at Dearborn, Mich. (Ford 3 Pratt and Whitney Wasps.)

J. K. O'Meara establishes American glider altitude record of 6 hrs. 48 min. at Elmira, N. Y.

Willired G. Moore establishes altitude record for light airplanes of first category of 18,543 ft. at Kansas City, Mo. (Inland Sport, Warner motored.)

Air mail service from Cristobal, C. Z., extended to La Guaira, Venezuela, by Pan American Airways.

British airship R-101 destroyed at Beauvais, France, causing death to 48 persons.

Laura Ingalls flies from New York to Los Angeles in 30 hrs. 27 min. flying time. (DeHavilland Moth, DeHavilland Gipsy motored.)

Capt. Errol Boyd and Lieut. H. P. Connor fly from Harbor Grace, Newfoundland, to Croydon, England, after being forced down on Scilly Islands. (Bellanca, Wright Whirlwind motored.)

Comdr. Charles Kingsford-Smith flies from Heston, England, to Port Darwin, Australia, in 9 days, 23 hrs. 30 min., establishing new record. (Avro Avian, DeHavilland Gipsy motored.)

Warren Eaton establishes American glider altitude record of 2,409 ft. at Elmira, N. Y.

Laura Ingalls flies from Los Angeles to New York in 25 hrs. 35 min. flying time. (DeHavilland Moth, DeHavilland Gipsy motored.)

Mrs. Keith Miller flies from New York to Los Angeles in 25 hrs. 44 min. flying time. (Alexander Bullet, Wright Whirlwind motored.)

Southern Air Fast Express inaugurates southern transcontinental air mail route from Atlanta to Los Angeles, connecting with Eastern Air Transport at Atlanta.

All-Eastern States Air Races held at Trenton, N. J., under auspices of American Legion.

Mrs. Keith Miller flies from Los Angeles to New York in 21 hrs. 47 min. flying time. (Alexander Bullet, Wright Whirlwind motored.)

Transcontinental and Western Air, Inc., inaugurates transcontinental air mail and passenger line between New York and Los Angeles.

L. F. Shoehnair establishes speed record for 1,000 kilometers at 164.26 m.p.h. at Akron, Ohio. (Lockheed Vega, Pratt and Whitney Wasp motored.)

McNary-Watres Act, changing payment to air mail contractors from a poundage to a mileage-space basis, goes into effect.

Midwestern States Traffic and Aviation Conference held at Chicago under auspices of Chamber of Commerce of the United States and Aeronautical Chamber of Commerce.

Capt. Edward V. Rickenbacker receives Congressional Medal of Honor in recognition of service during World War.

Capt. Frank M. Hawks flies from New York to Havana, Cuba, in 9 hrs. 21 min. elapsed time. (Travel Air Mystery S, Wright Whirlwind motored.)

North Central States Traffic and Aviation Conference held at Minneapolis, Minn., under auspices of Chamber of Commerce of the United States and Aeronautical Chamber of Commerce.

Capt. Goulette and M. Lelouette fly from Paris to Saigon, French Indo-China, in 5 days, 3 hrs. 50 min., establishing new record. (Farman, Lorraine motored.)
Capt. Frank M. Hawks flies from Havana, Cuba, to New York in 8 hrs. 44 min. elapsed time. (Travel Air Mystery S, Wright Whirlwind motored.)

Nov. 9-10 Capt. Roy W. Ammel flies non-stop from New York to France Field, Panama Canal Zone, in 24 hrs. 35 min. (Lockheed Sirius, Pratt and Whitney Wasp motored.)

Nov. 19-20 Southern States Traffic and Aviation Conference held at Atlanta, Ga., under auspices of Chamber of Commerce of the United States and Aeronautical Chamber of Commerce.

Nov. 24-25 Southwestern States Traffic and Aviation Conference held at Dallas, Tex., under auspices of Chamber of Commerce of the United States and Aeronautical Chamber of Commerce.

Nov. 24-Dec. 1 Ruth Nichols flies from New York to Los Angeles in 16 hrs. 59 min. 39 sec. flying time. (Lockheed Vega, Pratt and Whitney Wasp motored.)

Nov. 27 Air mail service inaugurated by Pan American Airways, Inc., between Paramaribo, Dutch Guiana, and Santos, Brazil.

Nov. 28-Dec. 14 International Aeronautical Exposition held at Paris, France.

Dec. 2 Pan American Airways Miami-Cristobal mail rerouted to include Cienfuegos, Cuba, and Kingston, Jamaica, inaugurating longest regular service over water.

Dec. 5 Herbert Schiff Trophy for Naval Aviation awarded to Fighting Plane Squadron 3-B.

Dec. 5-6 Western States Traffic and Aviation Conference held at Portland, Ore., under auspices of Chamber of Commerce of the United States and Aeronautical Chamber of Commerce.

Dec. 9-10 Ruth Nichols flies from Los Angeles to New York in 13 hrs. 21 min. flying time, or 29 hrs. 1 min. 43 sec. elapsed time. (Lockheed Vega, Pratt and Whitney Wasp motored.)

Dec. 10-23 First International Congress for Aerial Safety held at Paris, France.

Dec. 16-17 National Conference on Uniform Aeronautic Regulatory Laws held in Washington, D. C., under auspices of Aeronautics Branch of Department of Commerce.
APPENDIX
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Spartan Aircraft Co., Salton, Ola.
Stearman Aircraft Co., Wichita, Kansas.
Stinson Aircraft Corp., Wayne, Mich.
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Ministry of Public Works, Prague-Smíchov, Czechoslovakia.

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Under-Secretary of State, Cairo, Egypt.

D. D. Long, Air Consultant, Ministry of Communication, Cairo, Egypt.

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Colonel García Granados, Director General of Civil Aeronautics, Guatemala City, Guatemala.
<table>
<thead>
<tr>
<th>Country</th>
<th>Officer/Role</th>
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<tbody>
<tr>
<td>General José Victor Mejía, Director Escuela de Aviacion, Guatemala City, Guatemala.</td>
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</tr>
<tr>
<td>HONDURAS</td>
<td>Ministro de Guerra y Marina, Tegucigalpa, Honduras.</td>
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<tr>
<td>INDIA</td>
<td>Lt. Col. F. G. Shelmardine, O. B. E., Director of Civil Aviation, Department of Industries and Labor, Government of India, Delhi, India.</td>
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<tr>
<td>INDIA</td>
<td>Col. A. Sams, Director-General of Posts &amp; Telegraphs, Delhi, India.</td>
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<tr>
<td>ITALY</td>
<td>Gen. Italo Balbo, Secretary of State for A. Air Ministry, Rome, Italy.</td>
</tr>
<tr>
<td>ITALY</td>
<td>Maj. Gen. R. Young, New Zealand Air Force, Imperial Secretariat, Raisina, Delhi, India.</td>
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<tr>
<td>ITALY</td>
<td>Dr. Wolff, Engineer and Director, Government Institution for the Study of Aeronautics, Amsterdam, The Netherlands.</td>
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<tr>
<td>ITALY</td>
<td>Capt. J. P. Remijnse, Commanding Officer, Royal Naval Air Service, De Koij, The Netherlands.</td>
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<tr>
<td>JAPAN</td>
<td>Col. S. Fundzevicius, Chief of Aviation, Ministry of Defence, Kovno, Lithuania.</td>
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<td>LATVIA</td>
<td>Col. Bashko, Commander of Aviation Regiment, Riga, Latvia.</td>
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<tr>
<td>MEXICO</td>
<td>Gen. Pedro Caloca, Jefe del Departamento de Aviacion Militar, Secretaria de Guerra y Marina, Mexico, D. F.</td>
</tr>
<tr>
<td>MEXICO</td>
<td>Lt. Col. T. Klingenberg, Chief Army Air Corps, Kjeller Flyreplass per Lillestrom, Norway.</td>
</tr>
<tr>
<td>MEXICO</td>
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</tr>
<tr>
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<td>Ing. Juan Guillermo Villasana, Jefe del Departamento, de Aeronautica Civil Secretaria de Comunicaciones y Obras Publicas, Mexico, D. F., Mexico.</td>
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<tr>
<td>NETHERLANDS</td>
<td>Capt. J. P. Remijnse, Commanding Officer, Royal Naval Air Service, De Koij, The Netherlands.</td>
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<tr>
<td>NETHERLANDS</td>
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</tr>
<tr>
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AERONAUTICAL MAGAZINES OF THE UNITED STATES

Aero Digest, 220 West 42nd Street, New York, N. Y.
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Aeronautical World Journal of Commerce, 1709 West 8th Street, Los Angeles, Calif.
Aircraft Age, 123 East 32nd Street, Kansas City, Mo.
Aircraft Screwing, Bank of Manhattan Building, Flushing, L. I., N. Y.
Airport Construction and Management, 145 S. Spring Street, Los Angeles, Calif.
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Airway Age, 30 Church Street, New York, N. Y.
Aviation, 475 Tenth Avenue, New York, N. Y.
Aviation Engineering, 52 Vanderbilt Avenue, New York, N. Y.
Aviation Mechanics, 96 Park Place, New York, N. Y.
Journal of Air Law, 357 East Chicago Avenue, Chicago, Ill.
Model Airplane News, 25 West 43rd Street, New York, N. Y.
National Aeronautic Magazine, Du Pont Circle, Washington, D. C.
National Power Glider, 370 Seventh Avenue, New York, N. Y.
Official Aviation Guide of the Airways, 105 West Adams Street, Chicago, Ill.
Pacific Flyer, 547 Mission Street, San Francisco, Calif.
Popular Aviation, 608 S. Dearborn Street, Chicago, Ill.
Southern Aviation, Grant Building, Atlanta, Ga.
Sportsman Pilot, 220 West 42nd Street, New York, N. Y.
U. S. Air Services, Transportation Building, Washington, D. C.
Western Flying, 145 S. Spring Street, Los Angeles, Calif.

FOREIGN AERONAUTICAL MAGAZINES

Argentina
Aviacion, Calle José Pedro Varela, 3762, Buenos Aires.
Boletin del Aero-Club Argentino, Avenida de Mayo, 646, Buenos Aires.

Australia
Aircraft, Peacock House, 486-490 Bourke Street, Melbourne.

Austria
Flug, Tragmasse 11, Vienna III.
Flugzeug und Flacht, Friedrichstrasse 3, Vienna I.
Oesterreichischer Motor der Flug, Josef-Stadlerstrasse 87, Vienna VIII.

Belgium
Bulletin d'Informations du Secretariat de Propagande Aeronautique, 90 rue de la Loi, Brussels.
Conquete de l'Air, 16 Rue Theresium, Brussels.

Brazil
Aeronautica, 131 Avenida Rio Branco, Rio de Janeiro.
Aviacao, Escola de Aviacao Militar, Rio de Janeiro.

Canada
Canadian Air Review, Grosvenor at Bay Street, Toronto.
Canadian Aviation, 210 Dundas Street, W., Toronto 2.

Chile
Auto y Aéreo, Casilla 3319, Santiago.
Chile Aéreo, Casilla 913, Santiago.

China
Aeronautica, Pekin.
Yu Phong, Pekin.

Cuba
El Automovil et Aeronautica, Tenien e rey 92, Havana.
Revista del Transporte, Ave de la Republica 85, Havana.

Czechoslovakia
Flugwesen, Konviktgasse 22, Prague I.
Leitec, 8 Lucemburska, Prague XII.
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Bulletin de la Chambre Syndicale des Industries Aeronautique, 9 Rue Anatole-de-la-Forge, Paris.
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Journal de l'Aviation Francaise, 80 Rue Taitbout, Paris.
La Technique Aéronautique, 5 Rue de l'Isly, Paris.
La Vie Maritime et Aérienne, 24 Rue des Ardennes, Paris.

Germany
Der Adler, Seyfferrstrasse 66c, Stuttgart. Automobil-Flugwelt, Breitestr. 8-9, Berlin C. 2.
Deutsche Motor Zeitschrift, Müller-Bersestr. 17, Dresden A. 19.
Deutsche Sportflieger, Krausenstr. 35, Berlin S. W. 19.
Flugsport, Bahnhofsplatz 8, Frankfurt.
Ikarus, Luftfahrt-Verlag g.m.b.H., Krausenstr. 35, Berlin S. W. 19.
Illustrirte Flug-Woche, Augustastrasse 18, Berlin.
Luft- und Kraftfahrt, Michael kirchplatz 1, Berlin S. O. 16.
Luftschaup, Blumes Hof 17, Berlin W. 35.
Luftwacht, Blumes Hof 17, Berlin W. 35.
Mitteldeutsche Luftfahrt, Lassenerstrasse 20, Gera.
Zeitschrift für Flugtechnik und Motorluftschifffahrt, Guck str. 8, Munich.

Great Britain
Aircraft Engineering, 6 Norfolk Street, Strand, London, W. C. 2.
Airways, 6 Norfolk Street, Strand, London, W. C. 2.
Flight, 36 Great Queen Street, Kingsway, London, W. C. 2.

Hungary
Aviation, Longyay utca 36, Budapest IX.

Italy
Aeronautica, Via Gesù 6, Milan.
Aerotecnica, Via delle Coppelle 35, Rome.
L'Aeritalia, Via Settala 22, Milan.
Atti dell'Associazione Italiana di Aeronautica, Via delle Coppelle 85, Rome.
L'Aerodromo, Corso Umberto 112, Rome.
L'Aviazione, Via della Aviazione Civile e del Traffico Aereo, Via della Mercede 9, Rome.
Le Comunicazioni Aeree, Via Propaganda 25, Rome.
Il Diritto Aeronautico, Piazza Foro Traiano 1, Rome.

Notiziario Tecnico di Aeronautica, Via Agostina De Pretis 45 A, Rome.
Rassegna Maritima Aeronautica Illustrata, Via Ulisse Seni 5, Rome.
Rendiconti Tecnici, Ministero dell'Aeronautica, Rome.
Revue Aeronautique, Via Agostino De Pretis 45 A, Rome.
La Via Azzurra, 28 Via Cuma, Naples.
Le Vie dell'Aria, Via Pincenza 6, Rome.

Japan
Hiko, Tuikoki-Hiko-Kyokwai, 1 Chome, Yurakucho, Marunouchi, Tokyo.

Mexico
Aviacion, San Juan de Lotran 6, Mexico City.
El Piloto, Tiajuna B. C.
Revista Aerea, Departamento Aeronautico, Mexico City.

Netherlands
Het Vliegboek, Heerengracht 450, Amsterdam.

Norway
Lustteils, Myntgaten 2, Oslo.

Peru
El Motor, 694 Lampa, Lima.

Poland
Lot Polski, Dluga 50, Warsaw.
Lotnik, Fr. Katalczak 21b, Roszen.
Modly Lotnik, Krakowski Przedmiecie 57, Warsaw.
Przeglad Lotniczy, Warsaw.

Portugal
Revista Aeronautica, Traversa de Gloria, 22, A 2° D. Lisbon.

Rumania
Aripa, Str. Clemenceau 10, Bucharest.
Aeronautica Romana, 128 Calea Grivitei, Bucharest.
Romania Aeri, Strada Romana 171, Bucharest.

Russia
Aviation and Chemistry, Ilinka, Khrus- talnyy per, Moscow.
Messenger of the Aero Fleet, Ilinka 3, Moscow.

Spain
Aero, Glorieta de Atocha 8, Madrid.
Alas, Plaza de la Lealtad 4, Madrid.
Boletin Oficial de la Dirección General de Navegación y Transportes Aereos, Madrid.
Boletin Oficial del Real Aero-Club de España, Madrid.
España Automovil y Aeronautica, Plaza de Isabel II, 5, Madrid.
Heraldo Deportivo, Abascal 364, Madrid.
Icaro, Pi y Margall, 18, Madrid.

Sweden
Flygning, Jakobsogten 6, Stockholm.

Switzerland
Aero Revue, Sihlstrasse 43, Zurich.
En Plein Vol, Case Ville 1374, Lausanne.

Uruguay
Revista del Centro Militar y Naval, Convencion 1324, Montevideo.
A SELECTED LIST OF COMMERCIAL AIRPORTS AND AIRPORT MANAGERS IN THE UNITED STATES

December 31, 1930

All airports listed have sufficient landing area for normal landing and take-offs.
Municipally owned fields are indicated by (m) preceding the name of the airport.
Service facilities are indicated by the letters following the names as follows:

- T—Transportation available to town. (The existence of taxi service which can be called by telephone is considered transportation.)
- H—Hangar space is available for the storage of airplanes.
- M—Mechanic services available for minor repairs.
- R—There is a restaurant on the field.
- L—The field is lighted for night use.
- W—Weather information is available at the airport.

The list does not include intermediate or auxiliary fields.

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ARKANSAS:

Brinkley (m) | Brinkley Airport.              | T       | City Council                    |
| Ft. Smith | Chamber of Comm. Airport.      | THM     | John R. Tate                    |
| Hot Springs (m) | Chamber of Comm. Air- | THM     | Frank Horsfall                  |
| Little Rock (m) | Little Rock Airport.           | THML    | Kenneth Garrett                 |
| Pine Bluff |                              |         |                                |
| Texarkana (m) | Texarkana Municipal Airport.   | THML    | Kenneth Garrett                 |

CALIFORNIA:

Alameda  | San Francisco Bay Airdrome.    | THML    | R. U. St. John                  |
| Amboy   | Amboy Airport.                 | TM      | Capt. Chadwick Thompson         |
| Bakersfield (m) | Kern County Airports.        | THML    | H. B. Griffin, Supt.            |
| Banning | Banning Airport.               | TM      | D. A. Innes                     |
| Barstow  | Barstow Airport.               | THML    | Joseph Kasulatis                |
| Neilson Field |                             |         |                                |

All airports listed have sufficient landing area for normal landing and take-offs.
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### AIRCRAFT YEAR BOOK

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#### CONNECTICUT:

- Bridgeport Airport: THMLW, W. Parker Seeley
- Danbury Airport: THMLW, W. Parker Seeley
- Hartford Airport: THMLW, A. L. Kittredge
- Meriden Airport: THMLW, H. F. Bowers, C. M.
- Groton Airport: THMLW, E. L. Markham
- Wallingford Airport: THMLW

#### DELAWARE:

- Bellanca Field: THMLW, Del. Flying Service

#### DIST. OF COLUMBIA:

- Hoover Field: THMLW, John S. Wynne
- Washington Airport: THMLW, Paul J. Rabbitt

#### FLORIDA:

- Clearwater: THMLW, A. C. Banks
- Jacksonville: THMLW, J. R. Griffiths, Mgr.
- Key West: THMLW
- Lakeland: THMLW
- Leesburg: THMLW
- Melbourne: THMLW, Clair A. Insee, C. M.
- Miami: THMLW, Aviation Comm. of C. of C.
- Osceola: THMLW
- Orlando: THMLW, A. P. Krueger, Mgr.
- Tallahassee: THMLW, Wm. R. Gault, C. M.
- Titusville: THMLW, N. T. Froshier, Mgr.

#### GEORGIA:

- Albany Airport: THMLW, J. H. Gray, Mgr.
- Athens: THMLW, J. B. Lee, Mgr.
- Savannah: THMLW, H. B. Crawford, C. M.
- Thomasville: THMLW, H. Wimpy
- Valdosta: THMLW, P. W. Robertson, Chrm.
### Appendix

#### Location | Name of Port | Service | Manager
---|---|---|---
**Idaho:**
Boise | Beise Muni. Airport | THMRLW | Ivan Nelson, Mgr.
Caldwell | Walker Field | H | 
Coeur D'Alene | Coeur D'Alene Airport | THMRLW | George Natwick, Mayor
Twin Falls | Twin Falls Airport | H | Twin Falls, C. of C.

**Illinois:**
Aurora | Midwest Airport | THMRLW | John H. Livingston, Mgr.
Carbondale | Cairo Landing Field | THMRLW | John Allen Casey
Champaign | Chamber of Com. Airport | H | 
Chicago | Aero Club Field | H | 
Cicero Ave. | Chicago Mun. Airport | THMRLW | 
Danville | Chamber of Com. Airport | THM | 
East St. Louis | Curtis-Steinberg Airport | THM | 
Elgin | Elgin Airport | THM | 
Elmhurst | Elmhurst Airport | THM | 
Galesburg | Galena Airport | THM | 
Harrisburg | Harrisburg Airport | THM | Dr. Neubauer
Hoecker | Eagle Airport | THMRLW | 
Joliet | Joliet Mun. Airport | THMRLW | 
Lansing | Ford Airport | THMRLW | 
Marion | Marion Airport | THMRLW | 
Moline | Moline Airport | THMRW | 
Monmouth | Monmouth Airport | THML | 
Mt. Prospect | Pal-Waukee Airport | THMRLW | 
Oaklawn | Harlem Airport | THM | 
Peoria | Lufbery Flying Field | THMRW | 
Rockford | Rockford Airport | THMRLW | 
St. Elmo | Smith Field | THMRLW | 
Springfield | Commercial Landing Field | THMRLW | 
Sterling | Sterling Airport | THM | 
Stockton | Stockton Airport | THMRLW | 

**Indiana:**
Anderson | Welch Airport | THM | 
Bedford | Bedford Airport | THMRLW | Jamison
Evansville | Evansville Airport | THMRLW | 
Fort Wayne | Baer Field | THMRLW | Robert R. Bartel, Mgr.
Guy Measns | Captain F. C. Corriss
Frankfort | Frankfort Airport | THMRLW | 
Gary | Gary Airport | THMRLW | 
Indianapolis | Capital Airways Field | THMRLW | 
Indianapolis, R.R. 18, S. 300R. | | 
Indianapolis (m) | Hoosier Airport, Inc. | THMRLW | Bob Shank, Mgr.
Knox | Knox Airport | THMRLW | 
Kokomo | Shackleley Field | THMRLW | 
Peru | Peru Airport | THMRLW | 
Richmond | Richmond Airport | THMRLW | 
Seymour | Seymour Airport | THMRLW | 
South Bend | Municipal Airport | THMRLW | 
Terre Haute | Dresser Field | THMRLW | 
Valparaiso | Valparaiso Airport | THMRLW | 
Vincennes | Vincennes Airport | THMRLW | 
Walsh, 485 W. Canal St. | Rettig Airport | THM | Geo. O. Rettig

**Iowa:**
Ames | American Legion Airport | THM | American Legion
Burlington | Burlington Mun. Airport | TH | 
Cedar Rapids | Centerville Airport | TH | 
Clarinda | Clarinda Airport | TH | 
Council Bluffs | Council Bluffs Airport | THM | 
Davenport | Davenport Field | THMRLW | 
Dubuque | Dubuque Airport | THMRLW | 
Fort Dodge | Fort Dodge Airport | THM | 
Galena | Galena Airport | THM | 
Harpers Ferry | Harpers Ferry Airport | THM | 
Kirkwood | Kirkwood Airport | THMRLW | 
Keokuk | Keokuk Airport | THMRLW | 
Lambert | Lambert Field | THMRLW | 
Moline | Moline Field | THMRLW | 
Muscatine | Muscatine Airport | THMRLW | 
New Hampton | New Hampton Field | THMRLW | 
Portsmouth | Portsmouth Field | THMRLW | 
Quantrill | Quantrill Field | THMRLW | 
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Sibley | Sibley Airport | THMRLW | 
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Sterling | Sterling Airport | THMRLW | 
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Waverly | Waverly Field | THMRLW | 
Williamsburg | Williamsburg Field | THMRLW | 
Winterset | Winterset Field | THMRLW | 
Wyoming | Wyoming Field | THMRLW | 

**Washington:**
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Coeur D'Alene | Coeur D'Alene Airport | THMRLW | 
Pocatello | Pocatello Mun. Airport | THMLW | 
Twin Falls | Twin Falls Airport | THMRLW | 

**Kansas:**

**Michigan:**

**Mississippi:**

**Minnesota:**

**Missouri:**

**Nebraska:**

**New Mexico:**

**New York:**

**North Carolina:**

**Ohio:**

**Oregon:**

**Pennsylvania:**

**Texas:**

**Virginia:**

**West Virginia:**

**Wisconsin:**

**Wyoming:**
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### AIRCRAFT YEAR BOOK

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| Libby | | Toman Field | T |
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| Missoula | (m) Missoula Airport | THML | |
| Sidney | (m) Sidney Airport | TH | W. M. Combes |
| Terry | (m) Terry Airport | | J. F. Patterson |
| Wolf Point | (m) Wolf Point Airport | | James F. Cook |
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| Blair City | (m) Municipal Airport | THMLW | H. J. Dunn, Chr. |
| Grand Island | (m) Municipal Airport | THMLW | James Fisher |
| Hastings | (m) Hastings Mun. Airport | THMW | J. D. Wolf, Mgr. |
| Havelock | | Arrow Airport | THMW | D. L. Erickson, C. E. |
| Kearney | (m) Municipal Airport | THMW | Robert E. Gehrman |
| Lincoln | (m) Municipal Airport | THMLW | L. B. Miller, C. P. |
| McCook | (m) American Legion Airport | | |
| North Platte | (m) North Platte Airport | THMLW | C. H. Sluder |
| Ogallala | | Ogallala Airport | | |
| Omaha | (m) Omaha Mun. Airport | THMLW | Jay Dudley, Mgr. |
| Scottsbluff | (m) Scottsbluff Airways Airport | THMRLW | |
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| Ely | (m) Ely Airport | THM | C. W. Sutterfield |
| Las Vegas | (m) Las Vegas Airport | THMLW | Walter Avery |
| Reno | (m) Reno Airport | THMLW | W. Sanger, Mgr. |
| Yerington | (m) Yerington Field | | |
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| Concord | (m) Concord Airport | THMRW | Horton C. Chandler, Mgr. |
| Manchester | (m) Manchester Airport | THM | |
| Newport | (m) Newport Airport | | |
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| Camden | | Central Airport | THMLW | W. Sanger, Mgr. |
| Dover | | Teterboro Airport | THMRW | J. W. DeBraeubie |
| Freehold | | Kenvill | | |
| Hackensack | | Keyport | | |
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| Trenton | (m) Mercer Airport | THMLW | J. F. Casey, Pres. |</p>
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**APPENDIX**

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<td>M. G. Robinson</td>
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<tr>
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<tr>
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<td>Lynchburg</td>
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<tr>
<td>Box 782 (m)</td>
<td>Preston Glenn Airport</td>
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<td>Port Richmond (m)</td>
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<td>Richmond Air Transport</td>
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<td>Mayor</td>
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<td>Charles Field</td>
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<td>Richmond Air Junction</td>
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<td>Winchester</td>
<td>Bowler Field</td>
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<td>Roy W. Richards</td>
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**WASHINGTON:**

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<tbody>
<tr>
<td>Aberdeen (m)</td>
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<td>Bellingham</td>
<td>Graham Field</td>
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<td>R. C. Graham</td>
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<td>Centralia (m)</td>
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<td>HM</td>
<td>T. R. Patton</td>
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<td>Everett (m)</td>
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<td>E. L. Zastrow</td>
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<td>Kennewick (m)</td>
<td>Kennewick Airport</td>
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<td>Maj. David G. Logg</td>
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<tr>
<td>Olympia (m)</td>
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<td>THMLW</td>
<td>Country Commissioners</td>
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<tr>
<td>Tacoma, P.O. Box 1183 (m)</td>
<td>Tacoma Field</td>
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<td>L. E. Wilkerson</td>
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**WEST VIRGINIA:**

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<td>Bluefield</td>
<td>College Field</td>
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<tr>
<td>Moundsville</td>
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<tr>
<td>Morgantown (m)</td>
<td>Morgan Field</td>
<td>TR</td>
<td>W. E. Brooks, C. M.</td>
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<td>White Sulphur Springs</td>
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**WISCONSIN:**

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<td>E. West</td>
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<td>Athelstane (m)</td>
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<td>H</td>
<td>R. H. Schaf</td>
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<tr>
<td>Delavan (m)</td>
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<td>J. D. Campbell</td>
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<tr>
<td>Eagle River</td>
<td>Kraystone Air Park</td>
<td>TR</td>
<td>F. C. Steenmuller</td>
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<tr>
<td>Fond Du Lac</td>
<td>Ottar Rapids Airport</td>
<td>TR</td>
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<tr>
<td>Green Bay</td>
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<td>TRL</td>
<td>C. Berry</td>
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<td>Kohler (m)</td>
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<td>A. W. Sommers</td>
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<td>LaCrosse (m)</td>
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<td>Vance Field</td>
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<td>F. Shaboka</td>
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<td>Marshfield</td>
<td>Miners Airport</td>
<td>TM</td>
<td>W. Miner</td>
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<td>Dan Kiser</td>
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<td>Milwaukee (City Hall R. 712 (m)</td>
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<td>Frank A. Kaiser, H. E.</td>
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<td>G. V. Kelly</td>
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<td>Rhinelander (m)</td>
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<td>Steve Shudbreek</td>
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<td>Sheboygan (m)</td>
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<td>F. E. Oikowaki</td>
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<td>H. D. Putnam</td>
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<td>Tri City Airport</td>
<td>THMW</td>
<td>Maj. L. G. Mulzer</td>
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**WYOMING**:  
- Casper  
  - Wardell Field  
  - THMLW  
  - E. C. Dugarte  
- Cheyenne  
  - Cheyenne Airport  
  - THMLWL  
  - Boeing Air Transport  
- Gillette  
  - Gillett Airport  
  - TW  
- Newcastle  
  - New Castle Airport  
- Pareo  
  - Pareo Airport  
- Rock Springs  
  - (m) Stevens Airport  
  - THMLWL  
  - Mayberry  
- Sheridan  
  - (m) Sheridan Airport  
  - Bob Garrett  
- Wheatland  
  - (m) Wheatland Airport  

**COMMERCIAL SEAPLANE TERMINALS**  

**Atlantic Coast**  

- **ARSHG**  
  - Atlantic City, N. J.  
  - Paul Bradley  
  - City of Baltimore  
- **ARSHG**  
  - Baltimore, Md.  
  - Bridgeport Airport, Inc.  
- **ARSHG**  
  - Bridgeport, Conn.  
  - Standard Oil Co. (N. J.)  
- **AG**  
  - Charleston, S. C.  
  - City of Boston  
- **ARGS**  
  - East Boston, Mass.  
  - City of Fort Myers  
- **ARSHG**  
  - Fort Myers, Fla.  
  - Curtiss-Wright Flying Service  
- **ARSHG**  
  - Miami, Fla.  
  - City of Miami  
- **ARSHG**  
  - Miami, Fla.  
  - Yale Flying Service  
- **ARSHG**  
  - New Haven, Conn.  
  - City of Newport News  
- **ARSHG**  
  - North Beach, Queens, L. I., N. Y.  
  - Curtiss-Wright Air Corp.  
- **ARGS**  
  - John A. Sullivan  
- **ARSHG**  
  - North Quincy, Mass.  
  - Portland Yacht Club  
- **AG**  
  - Portland, Me.  
  - American Aeronautical Corp.  
- **ARSHG**  
  - Port Washington, L. I., N. Y.  
  - Curtiss-Wright Flying Service  
- **ARSHG**  
  - Rockland, Me.  
  - City of South Jacksonville  
- **ARSHG**  
  - South Jacksonville, Fla.  
  - City of Wilmington  
- **ARG**  
  - Wilmington, N. C.  
  - City of Wilmington  

**Great Lakes**  

- **RG**  
  - Bristol, Pa.  
  - Keystone Aircraft Corp.  
- **RG**  
  - Chicago, Ill.  
  - South Park Commission  
- **RSG**  
  - Cleveland, O.  
  - Thompson Aeronautical Corp.  
- **RSG**  
  - Detroit, Mich.  
  - Thompson Aeronautical Corp.  
- **AG**  
  - Erie, Pa.  
  - Erie Yacht Club  
- **AG**  
  - Essington, Pa.  
  - Frank Mills  
- **RG**  
  - Lake George, N. Y.  
  - Curtiss-Wright Flying Service  
- **RG**  
  - Milwaukee, Wis.  
  - City of Milwaukee  
- **RG**  
  - Muskegon, Mich.  
  - City of Muskegon  
- **ARSHG**  
  - Ottawa, Can.  
  - Department of National Defense  
- **ARG**  
  - Ontario Provincial Air Force  

**Gulf Coast**  

- **AG**  
  - Biloxi, Miss.  
  - Arthur Cambas  
- **ARSG**  
  - New Orleans, La.  

**Pacific Coast**  

- **R**  
  - Bremerton, Wash.  
  - Gorst Air Transport  
- **ASG**  
  - San Diego, Calif.  
  - City of San Diego  
- **RG**  
  - San Francisco, Calif.  
  - Air Ferries, Ltd.  
- **ARSHG**  
  - Seattle, Wash. (Lake Union)  
  - Alaska Washington Airways  
- **ARSHG**  
  - Seattle, Wash. (Lake Union)  
  - Barnes & Gorst Co.  
- **ARSHG**  
  - Seattle, Wash. (Lake Washington)  
  - Northwest Air Service, Inc.  
- **RG**  
  - Seattle, Wash. (Galbraith Pier)  
  - Gorst Air Transport  

(*)  
- **A**  
  - (Repair)  
- **R**  
  - Ramp  
- **S**  
  - Service  
- **H**  
  - Hangar  
- **G**  
  - Gas and Oil
# SEAPLANE ANCHORAGES

List Supplied by Hydrographic Office, Navy Department, Washington, D. C.

## Atlantic Coast

### CLASS I. ANCHORAGES WITH RAMP, ETC.

<table>
<thead>
<tr>
<th>State</th>
<th>Cities</th>
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<tbody>
<tr>
<td>Maine</td>
<td>Bar Harbor, Gloucester, South Dartmouth</td>
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<tr>
<td>Rhode Island</td>
<td>Newport (Gould Island), Bridgeport, New York</td>
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<tr>
<td>New Hampshire</td>
<td>Eastport, Portsmouth, Newburyport, Boston</td>
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<tr>
<td>Massachusetts</td>
<td>New Bedford, Nantucket, Vineyard Haven</td>
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<tr>
<td>Connecticut</td>
<td>Salem, Provincetown, Onset, Fall River</td>
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<tr>
<td>Florida</td>
<td>Providence, Stonington, New Haven, New London</td>
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<tr>
<td>New York</td>
<td>Port Jefferson, Long Island, Jamaica</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>Bristol, Essington, Philadelphia (Naval Aircraft Factory)</td>
</tr>
<tr>
<td>New Jersey</td>
<td>Cape May (Langley Field)</td>
</tr>
<tr>
<td>Virginia</td>
<td>Quantico, Hampton Roads (Naval Air Station)</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>Washington (Naval Air Station, Anacostia)</td>
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### CLASS II. ANCHORAGES WITH ORDINARY HARBOR FACILITIES

<table>
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<td>Elizabeth, Morehead City, Wilmington</td>
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<tr>
<td>New Hampshire</td>
<td>Edenton, New Bern, Southport</td>
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<tr>
<td>Rhode Island</td>
<td>Georgetown, Beaufort, Charleston</td>
</tr>
<tr>
<td>Connecticut</td>
<td>Savannah, Brunswick</td>
</tr>
<tr>
<td>Florida</td>
<td>Fernandina, St. Augustine, Titusville</td>
</tr>
<tr>
<td>New York</td>
<td>West Palm Beach, Jacksonville</td>
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<tr>
<td>Florida</td>
<td>Savannah, Brunswick</td>
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<td>Gulf Coast</td>
<td>Florida</td>
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## Gulf Coast

### CLASS I. ANCHORAGES WITH RAMP, ETC.

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### CLASS II. ANCHORAGES WITH ORDINARY HARBOR FACILITIES

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<td>Cedar Keys</td>
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<td>Carrabelle</td>
<td>Apalachicola</td>
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<td>Port St. Joe</td>
<td>Panama City</td>
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<td>New Valparaiso</td>
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<td>Alabama</td>
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<td>Pascagoula</td>
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<td>Bay St. Louis</td>
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<td>New Orleans</td>
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### Pacific Coast

#### CLASS I. ANCHORAGES WITH RAMP, ETC.

**California**
- San Diego (Naval Air Station)
- Santa Monica

**Washington**
- Seattle (Sand Point, Naval Reserve Air Station)
- Port Townsend
- Seattle

#### CLASS II. ANCHORAGES WITH ORDINARY HARBOR FACILITIES

**California**
- Los Angeles
- Port San Luis
- Santa Cruz
- Oakland
- Eureka
- Santa Catalina Island
- Monterey
- San Francisco
- Sausalito
- Crescent City
- Port Oxford

**Oregon**
- Marshfield
- Yaquina River
- Empire
- Winchester Bay
- Astoria
- Grays Harbor
- Port Angeles
- Everett
- Anacortes
- Neh Bay
- Bremerton
- Dungeness
- Bellingham

### ALASKAN FLYING FIELDS

List Supplied by Aeronautics Branch, Department of Commerce

- Anchorage, Anchorage Aviation Field, municipal
- Fairbanks, Weeks Field, commercial
- Port Yukon, Fort Yukon Aviation Field, commercial
- American Creek, American Creek Field, auxiliary
- Anchorage, Anchorage Field, auxiliary
- Bettles River, Bettles River Field, auxiliary
- Buff, Buff Field, auxiliary
- Cache Creek, Cache Creek Field, auxiliary
- Candle, Candle Field, auxiliary
- Cantwell, Cantwell Field, auxiliary
- Chandalar, Chandalar Field, auxiliary
- Chena Hot Springs, Chena Hot Springs Field, auxiliary
- Chicken, Chicken Field, auxiliary
- Chisana, Chisana Field, auxiliary
- Circle Hot Springs, Circle Hot Springs Field, auxiliary
- Copper Center, Copper Center Field, auxiliary
- Cordova, Cordova Field, auxiliary
- Curry, Curry Field, auxiliary
- Council, Council Field, auxiliary
- Deering, Deering Field, auxiliary
- Eagle, Eagle Field, auxiliary
- Flat, Flat Field, auxiliary
- Golovin, Golovin Field, auxiliary
- Healy, Healy Field, auxiliary
- Hot Springs, Manley Hot Springs Field, auxiliary
- Kantishna District, Kantishna Field, auxiliary
- Kaslof, Kaslof Field, auxiliary
- Kivalik, Kivalik Field, auxiliary
- Kobuk, Kobuk Field, auxiliary (formerly Shumagin)
- Kotzebue, Kotzebue Field, auxiliary
- Koyuk, Koyuk Field, auxiliary
- Lake Minchumina, Lake Minchumina Field, auxiliary
- Lake Spenard, Lake Spenard Field, auxiliary
- Livengood, Livengood Field, auxiliary
- Lost River, Lost River Field, auxiliary
- Lower Tonsina, Lower Tonsina Field, auxiliary
- McCarthy, McCarthy Field, auxiliary
- McGrath, McGrath Field, auxiliary
- Medfra, Medfra Field, auxiliary
- Moose Creek, Moose Creek Field, auxiliary
- Moses, Moses Field, auxiliary
- Nabesna, Nabesna Field, auxiliary
- Nenana, Nenana Field, auxiliary
- Ninilchik, Ninilchik Field, auxiliary
- Nome, Nome Field, auxiliary
- Nulato, Nulato Field, auxiliary
- Palmer Creek, Palmer Creek Field, auxiliary
- Pilgrim Springs, Pilgrim Hot Springs Field, auxiliary
- Ruby, Ruby Field, auxiliary
- Seward, Seward Field, auxiliary
- Solomon, Solomon Field, auxiliary
- Susitna Station, Susitna Station Field, auxiliary
- Talkeenta, Talkeenta Field, auxiliary
- Tanana, Tanana Field, auxiliary
- Telida, Telida Field, auxiliary
- Teller, Teller Field, auxiliary
- Unalakleet, Unalakleet Field, auxiliary
- Upper Tonsina, Upper Tonsina Field, auxiliary
- Valdez, Valdez Field, auxiliary
- Valdez Creek, Valdez Creek Field, auxiliary
- Cape Prince of Wales, Cape Prince of Wales Field, auxiliary
- Wasilla, Wasilla Field, auxiliary
- Willow Creek, Willow Creek Field, auxiliary
- Wiseman, Wiseman Field, auxiliary
FLYING IN THE UNITED STATES
Calendar Year 1930

Air Transport Summary

| Year | Operators | Planes in Service | Miles Flown | Passengers Carried | Miles Flown
|------|-----------|------------------|-------------|--------------------|----------------|
| 1926 | 19        | 95               | 4,608,880a  | 5,782              | 433,049
|      | 1927      | 24               | 5,242,830b  | 12,594             | 1,222,843d
|      | 1928      | 32               | 10,472,024  | 52,934             | 3,632,859f
|      | 1929      | 27               | 20,242,801  | 105,263            | 7,996,930
|      | 1930      | 35               | 28,833,967  | 385,910            | 8,002,201

a—Includes 2,883,056 miles flown on government operated mail routes.
b—Includes 1,320,535 miles flown on government operated mail routes.
c—Includes miscellaneous freight flown by special order.
d—Includes 121,430 pounds mail flown on government operated routes.
e—Includes 631,541 pounds mail flown on F.A.M. routes.
f—Includes only express poundage carried on regular schedules.

Aerial Service Summary

<table>
<thead>
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<th>Year</th>
<th>Operators Reporting</th>
<th>Planes in Service</th>
<th>Miles Flown</th>
<th>Passengers Carried</th>
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<td>1,080</td>
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<td>8,411,889</td>
<td>7,108</td>
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<td>104,336,500</td>
<td>5,324</td>
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<tr>
<td>1927</td>
<td>357</td>
<td>768</td>
<td>8,341,517</td>
<td>108</td>
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<td>8,411,889</td>
<td>7108</td>
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<td>104,336,500</td>
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</tr>
<tr>
<td>1928</td>
<td>168</td>
<td>480</td>
<td>8,411,889</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>104,336,500</td>
<td>5324</td>
</tr>
<tr>
<td>1929</td>
<td>800*</td>
<td>7,108</td>
<td>104,336,500</td>
<td>5324</td>
</tr>
</tbody>
</table>
| 1930 | 600*               | 5,324            | 95,059,045  | 2,621,769

* Statistical estimates based on typical reports.

Private Flying Summary

(Corporate and Personal)

<table>
<thead>
<tr>
<th>Year</th>
<th>Estimated</th>
<th>Miles Flown</th>
</tr>
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<tbody>
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<td>12,000,000</td>
<td>10,000,000</td>
</tr>
<tr>
<td>1929</td>
<td>25,000,000</td>
<td>20,000,000</td>
</tr>
<tr>
<td>1930</td>
<td>40,000,000</td>
<td>30,000,000</td>
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Government Operations

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<th>1927</th>
<th>1928</th>
<th>1929</th>
<th>1930</th>
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<tr>
<td>U. S. Army</td>
<td>16,764,540</td>
<td>14,871,870</td>
<td>19,546,450</td>
<td>27,405,700</td>
<td>32,500,000</td>
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<tr>
<td>U. S. Navy</td>
<td>8,352,800</td>
<td>10,652,720</td>
<td>14,135,000</td>
<td>19,315,095</td>
<td>26,378,700(b)</td>
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<tr>
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<td>28,060</td>
<td>83,083</td>
<td>48,254</td>
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<td>1,000,000</td>
<td>1,427,000</td>
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a—Includes National Guard.
b—Includes Marine Corps and Naval Reserve.

General Summary

<table>
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<th>Year</th>
<th>Miles Flown</th>
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</thead>
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<tr>
<td>1929</td>
<td>149,579,451 miles</td>
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<tr>
<td>1930</td>
<td>164,793,612 miles</td>
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<tr>
<td>1929</td>
<td>47,967,139 miles</td>
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<td>1930</td>
<td>60,473,355 miles</td>
</tr>
<tr>
<td>Type</td>
<td>Places</td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Biplanes</td>
<td></td>
</tr>
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<td>Open Cockpit</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3 Up</td>
</tr>
<tr>
<td>Total Biplanes</td>
<td></td>
</tr>
<tr>
<td>Monoplanes</td>
<td></td>
</tr>
<tr>
<td>Open Cockpit</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3 Up</td>
</tr>
<tr>
<td>Total Monoplanes</td>
<td></td>
</tr>
<tr>
<td>Cabin Single Engine</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>6</td>
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<tr>
<td></td>
<td>7 Up</td>
</tr>
<tr>
<td></td>
<td>8 and Up</td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Cabin Multi-Engine</td>
<td></td>
</tr>
<tr>
<td>Total Biplanes</td>
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</tr>
<tr>
<td>Total Monoplanes</td>
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</tr>
<tr>
<td>Seaplanes</td>
<td>11</td>
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<tr>
<td>Amphibians</td>
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<tr>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Grand Total</td>
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APPENDIX

PRODUCTION OF AIRPLANE ENGINES IN THE UNITED STATES

COMMERICAL AND MILITARY

<table>
<thead>
<tr>
<th>H.P.</th>
<th>1929 Production</th>
<th>1930 Production</th>
<th>1930 Sales</th>
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</thead>
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<tr>
<td></td>
<td>No.</td>
<td>Value</td>
<td>No.</td>
</tr>
<tr>
<td>Under 75</td>
<td>479</td>
<td>$367,950.00</td>
<td>215</td>
</tr>
<tr>
<td>75-125</td>
<td>1309</td>
<td>2,913,750.00</td>
<td>678</td>
</tr>
<tr>
<td>126-175</td>
<td>1238</td>
<td>3,156,000.00</td>
<td>58</td>
</tr>
<tr>
<td>176-225</td>
<td>565</td>
<td>1,635,500.00</td>
<td>280</td>
</tr>
<tr>
<td>226-300</td>
<td>552</td>
<td>1,990,000.00</td>
<td>260</td>
</tr>
<tr>
<td>301 up</td>
<td>148</td>
<td>8,727,100.00</td>
<td>424</td>
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<tr>
<td>Commercial Totals</td>
<td>5517</td>
<td>$17,893,300.00</td>
<td>1925</td>
</tr>
<tr>
<td>Military Totals</td>
<td>1861</td>
<td>8,600,530.15</td>
<td>1841</td>
</tr>
<tr>
<td>Commercial and Military Totals</td>
<td>7378</td>
<td>$26,495,830.15</td>
<td>3766</td>
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EXPORTS OF AIRCRAFT, ENGINES AND PARTS FROM THE UNITED STATES IN 1930

Compiled by the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C.

Airplanes, Seaplanes and Amphibians

<table>
<thead>
<tr>
<th>Country of Destination</th>
<th>1928</th>
<th>1930 First 11 Months</th>
</tr>
</thead>
<tbody>
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<td></td>
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<td>Value</td>
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<td>$102,175</td>
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<tr>
<td>Peru</td>
<td>24</td>
<td>190,810</td>
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<tr>
<td>Canada</td>
<td>52</td>
<td>685,712</td>
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<tr>
<td>Mexico</td>
<td>20</td>
<td>190,153</td>
</tr>
<tr>
<td>Brazil</td>
<td>5</td>
<td>66,340</td>
</tr>
<tr>
<td>Japan</td>
<td>3</td>
<td>63,000</td>
</tr>
<tr>
<td>China</td>
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<td>84,181</td>
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<tr>
<td>Argentina</td>
<td>5</td>
<td>55,052</td>
</tr>
<tr>
<td>Java and Madura</td>
<td>3</td>
<td>22,293</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>3</td>
<td>77,080</td>
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<tr>
<td>Panama</td>
<td>1</td>
<td>23,844</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>4</td>
<td>54,887</td>
</tr>
<tr>
<td>Cuba</td>
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<td>49,230</td>
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<tr>
<td>Colombia</td>
<td>1</td>
<td>95,470</td>
</tr>
<tr>
<td>Mexico</td>
<td>2</td>
<td>37,760</td>
</tr>
<tr>
<td>Indes</td>
<td>2</td>
<td>25,950</td>
</tr>
<tr>
<td>Italy</td>
<td>1</td>
<td>74,950</td>
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<tr>
<td>Union South Africa</td>
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<tr>
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<td>2,850</td>
</tr>
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<tr>
<td>Guatemala</td>
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<td>1,279</td>
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<td>1,220</td>
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<tr>
<td>Philippine Islands</td>
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<tr>
<td>Salvador</td>
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<tr>
<td>Honduras</td>
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<tr>
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<tr>
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<tr>
<td>French Oceana</td>
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<td>6,000</td>
</tr>
<tr>
<td>New Zealand</td>
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<td>3,000</td>
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<td>Australia</td>
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<td>Uruguay</td>
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<td>5,000</td>
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<td>4,183</td>
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<tr>
<td>Siam</td>
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<td>4,532</td>
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<tr>
<td>Total</td>
<td>162</td>
<td>$7,759,563</td>
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Note.—Late compilations of December exports, while not complete as this book goes to press, indicate that American exports for 1930 were within five per cent, of the total for the peak year 1929.
### Aircraft Engines

<table>
<thead>
<tr>
<th>Country of Destination</th>
<th>Full Year, 1928</th>
<th>First 11 Months, 1929</th>
<th>First 11 Months, 1930</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>23</td>
<td>177,096</td>
<td>105,418</td>
</tr>
<tr>
<td>Soviet Russia</td>
<td>2</td>
<td>8,062</td>
<td>43,242</td>
</tr>
<tr>
<td>Peru</td>
<td>1</td>
<td>159</td>
<td>105,869</td>
</tr>
<tr>
<td>Netherlands</td>
<td>14</td>
<td>62,712</td>
<td>45,368</td>
</tr>
<tr>
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<td>10</td>
<td>24,773</td>
<td>106,658</td>
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<td>10</td>
<td>23</td>
<td>77,385</td>
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<td>10</td>
<td>41,281</td>
<td>75,066</td>
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<tr>
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<td>48</td>
<td>177,096</td>
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<td>38,909</td>
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<td>1,810</td>
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<tr>
<td>Sweden</td>
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<td>200</td>
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<td><strong>Total</strong></td>
<td>179</td>
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</table>

### Aircraft Parts (Except Tires)

<table>
<thead>
<tr>
<th>Country of Destination</th>
<th>Full Year, 1928</th>
<th>First 11 Months, 1929</th>
<th>First 11 Months, 1930</th>
</tr>
</thead>
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<tr>
<td>Canada</td>
<td>$540,215</td>
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<td>$532,726</td>
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<td>337,087</td>
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<td>181,740</td>
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<tr>
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<tr>
<td>Mexico</td>
<td>21,162</td>
<td>108,037</td>
<td>76,455</td>
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### APPENDIX

<table>
<thead>
<tr>
<th>Country of Destination</th>
<th>Full Year, 1928</th>
<th>First 11 Months, 1929</th>
<th>First 11 Months, 1930</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
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<td>45,389</td>
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<td>87,544</td>
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</tr>
<tr>
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<td><strong>Total</strong></td>
<td>$1,249,244</td>
<td>$2,008,119</td>
<td>$2,172,501</td>
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### Comparative Tabulations of Accidents—Civil Aeronautics for the Years, 1927, 1928, 1929 and the First Six Months of 1930

(Compiled by Aeronautics Branch, Department of Commerce)

#### Mileage Flown Per Accident

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<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Miles flown in scheduled transport operations</td>
<td>5,870,489</td>
<td>4,484,612</td>
<td>6,188,838</td>
<td>9,201,338</td>
<td>15,940,161</td>
<td>16,602,728</td>
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<tr>
<td>Miles flown in miscellaneous operations, including student instruction and experimental flying</td>
<td>420,000,000</td>
<td>12,000,000</td>
<td>48,000,000</td>
<td>47,000,000</td>
<td>62,000,000</td>
<td>51,767,200</td>
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<tr>
<td>Total</td>
<td>35,870,489</td>
<td>16,484,612</td>
<td>54,188,838</td>
<td>56,201,338</td>
<td>78,940,161</td>
<td>68,669,928</td>
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<tr>
<td>Accidents, all services</td>
<td>1278</td>
<td>430</td>
<td>692</td>
<td>774</td>
<td>924</td>
<td>930</td>
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<tr>
<td>Miles flown per accidental, all services</td>
<td>$129,031</td>
<td>38,337</td>
<td>78,308</td>
<td>72,612</td>
<td>85,433</td>
<td>73,839</td>
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<tr>
<td>Accidents, scheduled transport operations</td>
<td>425</td>
<td>35</td>
<td>51</td>
<td>61</td>
<td>70</td>
<td>44</td>
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<tr>
<td>Miles flown per accidental, scheduled transport operations</td>
<td>234,820</td>
<td>128,132</td>
<td>121,330</td>
<td>150,842</td>
<td>209,730</td>
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<tr>
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<td>305</td>
<td>651</td>
<td>713</td>
<td>848</td>
<td>860</td>
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<td>Miles flown per accidental, miscellaneous operations</td>
<td>118,577</td>
<td>30,380</td>
<td>74,813</td>
<td>65,919</td>
<td>74,292</td>
<td>58,427</td>
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<td>Fatal accidents, all services</td>
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<td>97</td>
<td>120</td>
<td>127</td>
<td>183</td>
<td>150</td>
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<tr>
<td>Miles flown per fatal accident, all services</td>
<td>362,328</td>
<td>169,944</td>
<td>416,837</td>
<td>442,530</td>
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<td>7</td>
<td>6</td>
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<td>6</td>
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<tr>
<td>Miles flown per fatal accident, scheduled transport operations</td>
<td>1,467,622</td>
<td>896,022</td>
<td>88,120</td>
<td>1,022,371</td>
<td>1,062,677</td>
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<td>95</td>
<td>92</td>
<td>123</td>
<td>118</td>
<td>168</td>
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<td>Miles flown per fatal accident, miscellaneous operations</td>
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<td>130,435</td>
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<td>Pilot fatalities, all services</td>
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<td>69</td>
<td>92</td>
<td>87</td>
<td>140</td>
<td>123</td>
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<tr>
<td>Miles flown per pilot fatality, all services</td>
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<td>238,907</td>
<td>589,009</td>
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<td>4</td>
<td>5</td>
<td>9</td>
<td>14</td>
<td>5</td>
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<td>Miles flown per pilot fatality, scheduled transport operations</td>
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<td>1,237,708</td>
<td>1,092,371</td>
<td>1,138,583</td>
<td>3,380,545</td>
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<td>57</td>
<td>65</td>
<td>87</td>
<td>78</td>
<td>126</td>
<td>118</td>
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<td>Miles flown per pilot fatality, miscellaneous operations</td>
<td>526,316</td>
<td>184,615</td>
<td>551,724</td>
<td>602,564</td>
<td>590,000</td>
<td>438,705</td>
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* It should be borne in mind that weather conditions during the last 6 months of the calendar year are more favorable for flying than during the first 6 months, hence, in making comparisons, figures for corresponding periods should be used in each case.

†The figure of 30,000,000 miles listed under miscellaneous operations for 1927 was estimated from reports received on flying operations for 1928 as no operations report was made for 1927.

‡The 1927 figures should not be used for comparative purposes, as the accident reports for that period apparently were incomplete due to the fact that the inspection service was in the formative stage with a shortage of field personnel to carry on the work. For the same reason there were doubtless some unreported accidents in 1928.

§A fatal aircraft accident is one in which 1 or more persons (passengers, pilot, or crew) were killed or fatally injured.
### Causes of Accidents

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<th>Causes</th>
<th>Percentages</th>
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<td><strong>PERSONNEL:</strong></td>
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<td>Pilot:</td>
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<td>Error of judgment</td>
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<td>Poor technique</td>
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<td>Disobedience of orders</td>
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<tr>
<td>Carelessness or negligence</td>
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<tr>
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<td><strong>Material:</strong></td>
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<td><strong>Power Plant:</strong></td>
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<td>Fuel system</td>
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<td>Cooling system</td>
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<td>Ignition system</td>
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<td>Lubrication system</td>
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<td>Propellers and accessories</td>
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<td>Pontoon or boats</td>
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<td>Fuselage, engine mount, and fittings</td>
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<td><strong>Total structural failures:</strong></td>
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<td><strong>Handling qualities:</strong></td>
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<td><strong>Instruments:</strong></td>
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<td><strong>Total airplane failures:</strong></td>
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<td>Other</td>
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<td><strong>Total miscellaneous causes:</strong></td>
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<tr>
<td>Undetermined and doubtful</td>
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*Figures prior to 1929 include some minor mishaps.*
## AIRCRAFT APPOPRIATIONS, UNITED STATES

### 1922-1932

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<th>Kind of Flying</th>
<th>Per Cent. of Accidents</th>
<th>Total</th>
<th>Increase or Decrease</th>
<th>Net</th>
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<td>Student instruction</td>
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<td>Experimental...</td>
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<tr>
<td>Commercial.....</td>
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<tr>
<td>Pleasure.......</td>
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<tr>
<td>Total..........</td>
<td>100.00</td>
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</tr>
</tbody>
</table>

| 1922-23 | Army | $12,805,000 | -6,305,000 | -$4,470,000 |
| 1923-24 | Army | 14,083,900 | 1,270,159 | +50,000 |
| 1924-25 | Army | 12,426,000 | 1,270,159 | +50,000 |
| 1925-26 | Army | 14,700,000 | 1,270,159 | +50,000 |
| 1926-27 | Army | 15,700,000 | 1,270,159 | +50,000 |
| 1927-28 | Army | 16,000,000 | 1,270,159 | +50,000 |
| 1928-29 | Army | 17,000,000 | 1,270,159 | +50,000 |
| 1929-30 | Army | 18,000,000 | 1,270,159 | +50,000 |
| 1930-31 | Army | 19,000,000 | 1,270,159 | +50,000 |
| 1931-32 | Army | 20,000,000 | 1,270,159 | +50,000 |

### Injuries

<table>
<thead>
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<th>January to June,</th>
</tr>
</thead>
</table>

- Total: 102,100,000
- Fatal: 1,053,790
- Severe: 267,100
- Minor: 7,841
- No Injury: 99,985,414
- Total: 102,100,000
- Fatal: 1,053,790
- Severe: 267,100
- Minor: 7,841
- No Injury: 99,985,414

### Notes:

1. And contract authorization of $5,000,000.
2. And contract authorization of $10,000,000.
3. Includes $15,000 for printing.
4. Includes $7,000,000 for new and improved air navigation facilities.
5. Includes $6,000,000 for Foreign Air Mail.
6. Includes $23,000 for printing.
7. Includes $5,000,000 for new and improved air navigation facilities.
8. Includes $7,000,000 for Foreign Air Mail.

---

**Schedule:**

- Army: 1,000,000
- N.A.C.A.: 200,000
- Navy: 2,000,000
- Air Mail: 3,000,000
- Student: 4,000,000
- Commercial: 5,000,000
- Pleasure: 6,000,000

**Injuries:**

- Total: 102,100,000
- Fatal: 1,053,790
- Severe: 267,100
- Minor: 7,841
- No Injury: 99,985,414

**Proposed expenditures:**

- Army: $1,000,000
- N.A.C.A.: $200,000
- Navy: $2,000,000
- Air Mail: $3,000,000
- Student: $4,000,000
- Commercial: $5,000,000
- Pleasure: $6,000,000

---

**Proposed expenditures:**

- Army: $1,000,000
- N.A.C.A.: $200,000
- Navy: $2,000,000
- Air Mail: $3,000,000
- Student: $4,000,000
- Commercial: $5,000,000
- Pleasure: $6,000,000

---

**Contract authorizations:**

- Army: $1,000,000
- N.A.C.A.: $200,000
- Navy: $2,000,000
- Air Mail: $3,000,000
- Student: $4,000,000
- Commercial: $5,000,000
- Pleasure: $6,000,000
APPENDIX

Classified
1936, Inclusive

Kind of Flying | Per Cent. of Accidents | Fatal | Severe | Minor | No Injury | Total |
--- | --- | --- | --- | --- | --- | --- |
Schedule | 4.73 | 22 | 1 | 9 | 73 | 105 |
Student instruction | 22.04 | 2 | 1 | 0 | 2 | 5 |
Experimental | 1.54 | 1 | 0 | 6 | 0 | 5 |
Commercial | 13.4 | 42 | 13 | 33 | 187 | 273 |
Pleasure | 45.16 | 63 | 31 | 47 | 188 | 329 |
Total | 100.00 | 131 | 47 | 89 | 452 | 719 |

AIRPLANE IDENTIFICATIONS

October 15, 1930

| State | Total No. | No Date | Mfd. Prior 1926 | Mfd. 1927 | Mfd. 1928 | Mfd. 1929 | Mfd. 1930 | By Manufacturer | By Schools | By Aerial Service | By Others |
|--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Alabama | 18 | 4 | 3 | 1 | 3 | 3 | 4 | 12 | 6 |
| Arizona | 9 | | | | | | | 4 | 5 |
| Arkansas | 15 | 4 | 3 | 1 | 2 | 3 | | 5 | 10 |
| California | 187 | 54 | 48 | 46 | 18 | 19 | 19 | 23 | 13 |
| Colorado | 19 | 5 | 1 | 2 | 2 | 1 | 6 | 4 | 7 |
| Connecticut | 23 | 3 | 7 | 1 | 1 | 5 | 4 | 2 | 4 |
| Delaware | 10 | | | | | | | 2 | 2 |
| Florida | 49 | 12 | 4 | 2 | 6 | 3 | 4 | 3 | 24 |
| Georgia | 32 | 11 | 4 | 2 | 6 | 3 | 4 | 8 | 24 |
| Idaho | 6 | | | | | | | | 6 |
| Illinois | 197 | 30 | 16 | 16 | 10 | 28 | 26 | 25 | 23 |
| Indiana | 88 | 34 | 7 | 2 | 9 | 17 | 6 | 10 | 8 |
| Iowa | 44 | 19 | 2 | 2 | 4 | 9 | 5 | 3 | 6 |
| Kansas | 150 | 43 | 6 | 1 | 15 | 21 | 42 | 28 | 48 |
| Kentucky | 15 | 3 | 2 | 2 | 5 | 3 | 3 | 2 | 7 |
| Louisiana | 17 | 5 | 1 | 2 | 5 | 2 | 2 | 3 | 6 |
| Maine | 13 | | | | | | | 1 | 6 |
| Maryland | 20 | 6 | 1 | 2 | 2 | 3 | 6 | 2 | 1 |
| Mass. | 37 | 13 | 2 | 1 | 9 | 5 | 6 | 14 | 23 |
| Michigan | 120 | 43 | 14 | 6 | 15 | 11 | 20 | 11 | 20 |
| Minnesota | 61 | 10 | 1 | 5 | 12 | 12 | 12 | 3 | 17 |
| Mississippi | 6 | | | | | | | 4 | 2 |
| Missouri | 113 | 51 | 8 | 4 | 10 | 12 | 13 | 13 | 60 |
| Montana | 30 | 8 | 2 | 2 | 5 | 10 | 10 | 10 | 10 |
| Nebraska | 99 | 13 | 1 | 1 | 11 | 58 | 10 | 68 | 2 |
| Nevada | 1 | | | | | | | 1 | 1 |
| N. Hampshire | 1 | | | | | | | 1 | 1 |
| New Jersey | 96 | 40 | 10 | 14 | 14 | 16 | 16 | 27 | 57 |
| New Mexico | 3 | 2 | | | | | | 1 | 3 |
| New York | 182 | 52 | 23 | 9 | 16 | 25 | 35 | 22 | 20 |
| N. Carolina | 37 | 13 | 2 | 1 | 5 | 10 | 2 | 4 | 13 |
| N. Dakota | 32 | 17 | 4 | 2 | 1 | 3 | 2 | 3 | 16 |
| Ohio | 164 | 53 | 13 | 4 | 17 | 19 | 10 | 38 | 37 |
| Oklahoma | 99 | 42 | 6 | 2 | 13 | 13 | 13 | 10 | 10 |
| Oregon | 51 | 22 | | | 10 | 1 | | 10 | 28 |
| Penn. | 76 | 27 | 8 | 2 | 5 | 5 | 10 | 19 | 15 |
| Rhode Island | 7 | 3 | 1 | | | | | 1 | 4 |
| S. Carolina | 21 | 11 | 2 | 2 | 5 | 5 | 2 | 12 | 13 |
| S. Dakota | 16 | 3 | 3 | | 2 | 8 | | 6 | 10 |
| Tennessee | 25 | 8 | 2 | 3 | 6 | 2 | 4 | 14 | 11 |
| Texas | 90 | 42 | 11 | | 2 | 6 | | 38 | 49 |
| Utah | 7 | 2 | 2 | 3 | 1 | 2 | | 2 | 3 |
| Vermont | 2 | | 1 | | | | | 1 | 1 |
| Virginia | 19 | 8 | 2 | 6 | 4 | 2 | 3 | 6 | 10 |
| Washington | 34 | 10 | 4 | 2 | 9 | 6 | 12 | 2 | 15 |
| West Virginia | 20 | 6 | 3 | 1 | 1 | 1 | | 5 | 5 |
| Wisconsin | 69 | 26 | 9 | 2 | 8 | 5 | 11 | 8 | 23 |
| Wyoming | 9 | | | | 2 | 5 | 1 | 1 | 5 |
| Alaska, etc. | 12 | 6 | 2 | 1 | | | | 6 | 6 |
| Total | 2455 | 837 | 240 | 76 | 234 | 362 | 382 | 324 | 323 | 175 | 1375 |
AIRCRAFT YEAR BOOK
AIRPLANE LICENSES AND IDENTIF ICAT IONS
October r 5, r930

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## APPENDIX

### AIRPLANE LICENSES

October 15, 1930

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<th>Mfd. 1929</th>
<th>Mfd. 1930</th>
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<th>By Transpor</th>
<th>By Schools</th>
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## GLIDER LICENSES AND IDENTIFICATIONS

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**Total**            | 919          | 54                         | 51        | 814       | 263              | 656       

### AIR MAIL SERVICE

**Post Office Department**

**Washington, D. C.**

- Postmaster General: Walter F. Brown
- Second Assistant Postmaster General: W. Irving Glover
- Deputy Second Assistant Postmaster General: Chace C. Geve
- Superintendent: E. B. Wadsworth
- Assistant Superintendent: J. W. Sutherin
- B. P. Myers, Assistant Superintendent: Chicago, Ill.
- Joseph Mench, Assistant Superintendent: New York, N. Y.

E. R. White, Director: Division of International Postal Service
### AIR MAIL OPERATIONS BY ROUTES DURING CALENDAR YEAR 1930

#### Miles of Service

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<th>Route</th>
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* C.A.M. Consolidated with C.A.M. 5, effective July 1, 1930.
† Operations started October 1930.

**Note**—Figures are subject to very slight revisions as the result of late corrections sometimes filed by operators.

### Contract Air Mail Operators on December 31, 1930

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<td>Dallas, Tex.</td>
<td>Dallas, Tex.</td>
<td>1,078</td>
<td>0.95</td>
</tr>
<tr>
<td>7:30 P.M.</td>
<td>Dallas, Tex.</td>
<td>Chicago, Ill.</td>
<td>1,078</td>
<td>0.95</td>
</tr>
<tr>
<td>(including trip, Tulsa to Ponca City)</td>
<td>(including trip, Tulsa to Ponca City)</td>
<td>(including trip, Tulsa to Ponca City)</td>
<td>(including trip, Tulsa to Ponca City)</td>
<td></td>
</tr>
<tr>
<td>C. A. M. 4.</td>
<td>Western Air Express, Inc.</td>
<td>Los Angeles, Calif.</td>
<td>588</td>
<td>1.17†</td>
</tr>
<tr>
<td>12:00 A.M.</td>
<td>Salt Lake City, U.</td>
<td>Los Angeles, Calif.</td>
<td>588</td>
<td>1.17</td>
</tr>
<tr>
<td>9:30 A.M.</td>
<td>Salt Lake City, U.</td>
<td>Salt Lake City, U.</td>
<td>588</td>
<td>1.17</td>
</tr>
<tr>
<td>5:15 A.M.</td>
<td>Salt Lake City, U.</td>
<td>Salt Lake City, U.</td>
<td>588</td>
<td>1.17</td>
</tr>
<tr>
<td>4:30 A.M.</td>
<td>Salt Lake City, U.</td>
<td>Salt Lake City, U.</td>
<td>588</td>
<td>1.17</td>
</tr>
<tr>
<td>5:30 P.M.</td>
<td>Salt Lake City, U.</td>
<td>Salt Lake City, U.</td>
<td>588</td>
<td>1.17</td>
</tr>
</tbody>
</table>
### C. A. M. 5. Varney Air Lines, Inc.

<table>
<thead>
<tr>
<th>Time</th>
<th>Destination</th>
<th>Fares</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:30 P.M.</td>
<td>Salt Lake City, U.</td>
<td>-1,028-</td>
</tr>
<tr>
<td>11:30 P.M.</td>
<td>Seattle, Wash.</td>
<td>-1,028-</td>
</tr>
<tr>
<td>12:00 P.M.</td>
<td>Pasco, Wash.</td>
<td>-525-</td>
</tr>
<tr>
<td>12:15 P.M.</td>
<td>Portland, Ore.</td>
<td>125</td>
</tr>
<tr>
<td>12:45 P.M.</td>
<td>Pasco, Wash.</td>
<td>125</td>
</tr>
<tr>
<td>3:15 P.M.</td>
<td>Spokane, Wash.</td>
<td>125</td>
</tr>
</tbody>
</table>

**C. A. M. 6. Discontinued**

**C. A. M. 7. Discontinued**

**C. A. M. 8. Pacific Air Transport, Inc.**

<table>
<thead>
<tr>
<th>Time</th>
<th>Destination</th>
<th>Fares</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:15 P.M.</td>
<td>San Diego, Calif.</td>
<td>1,238</td>
</tr>
<tr>
<td>7:00 P.M.</td>
<td>Seattle, Wash.</td>
<td>1,238</td>
</tr>
</tbody>
</table>

*Including trip, San Jose to Oakland*

**C. A. M. 9. Northwest Airways, Inc.**

<table>
<thead>
<tr>
<th>Time</th>
<th>Destination</th>
<th>Fares</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:10 A.M.</td>
<td>Chicago, Ill.</td>
<td>892</td>
</tr>
<tr>
<td>11:30 A.M.</td>
<td>Chicago, Ill.</td>
<td>892</td>
</tr>
<tr>
<td>7:30 A.M.</td>
<td>Milwaukee, Wisc.</td>
<td>125</td>
</tr>
<tr>
<td>7:00 A.M.</td>
<td>Chicago, Ill.</td>
<td>132</td>
</tr>
<tr>
<td>2:45 P.M.</td>
<td>St. Paul, Minn.</td>
<td>892</td>
</tr>
<tr>
<td>8:45 A.M.</td>
<td>St. Paul, Minn.</td>
<td>892</td>
</tr>
<tr>
<td>4:30 P.M.</td>
<td>Green Bay, Wisc.</td>
<td>125</td>
</tr>
<tr>
<td>4:40 P.M.</td>
<td>Madison, Wisc.</td>
<td>132</td>
</tr>
</tbody>
</table>

**C. A. M. 10. Discontinued**

**C. A. M. 11. Pennsylvania Air Lines, Inc.**

<table>
<thead>
<tr>
<th>Time</th>
<th>Destination</th>
<th>Fares</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:15 P.M.</td>
<td>Cleveland, Ohio.</td>
<td>140</td>
</tr>
<tr>
<td>12:30 P.M.</td>
<td>Pittsburgh, Pa.</td>
<td>140</td>
</tr>
<tr>
<td>12:15 P.M.</td>
<td>Cleveland, Ohio.</td>
<td>140</td>
</tr>
<tr>
<td>3:40 P.M.</td>
<td>Pittsburgh, Pa.</td>
<td>140</td>
</tr>
</tbody>
</table>

**C. A. M. 12. Western Air Express, Inc.**

<table>
<thead>
<tr>
<th>Time</th>
<th>Destination</th>
<th>Fares</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:00 A.M.</td>
<td>Cheyenne, Wyo.</td>
<td>204</td>
</tr>
<tr>
<td>4:15 P.M.</td>
<td>Pueblo, Colo.</td>
<td>204</td>
</tr>
</tbody>
</table>

**C. A. M. 13. Discontinued**

**C. A. M. 14. Discontinued**

**C. A. M. 15. Discontinued**

**C. A. M. 16. Continental Air Lines, Inc.**

<table>
<thead>
<tr>
<th>Time</th>
<th>Destination</th>
<th>Fares</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:45 A.M.</td>
<td>Cleveland, Ohio.</td>
<td>351</td>
</tr>
<tr>
<td>6:15 P.M.</td>
<td>Louisville, Ky.</td>
<td>351</td>
</tr>
<tr>
<td>12:45 P.M.</td>
<td>Cleveland, Ohio.</td>
<td>31</td>
</tr>
<tr>
<td>3:45 P.M.</td>
<td>Akron, Ohio.</td>
<td>31</td>
</tr>
</tbody>
</table>

**C. A. M. 17. National Air Transport, Inc.**

<table>
<thead>
<tr>
<th>Time</th>
<th>Destination</th>
<th>Fares</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:30 A.M.</td>
<td>Chicago, Ill.</td>
<td>344</td>
</tr>
<tr>
<td>1:40 P.M.</td>
<td>Cleveland, Ohio.</td>
<td>393</td>
</tr>
<tr>
<td>8:30 P.M.</td>
<td>Chicago, Ill.</td>
<td>736</td>
</tr>
<tr>
<td>10:00 P.M.</td>
<td>New York, N. Y.</td>
<td>736</td>
</tr>
<tr>
<td>12:15 P.M.</td>
<td>New York, N. Y.</td>
<td>736</td>
</tr>
<tr>
<td>4:35 P.M.</td>
<td>New York, N. Y.</td>
<td>736</td>
</tr>
<tr>
<td>9:20 P.M.</td>
<td>New York, N. Y.</td>
<td>736</td>
</tr>
<tr>
<td>20:15 P.M.</td>
<td>New York, N. Y.</td>
<td>736</td>
</tr>
</tbody>
</table>
APPENDIX


8:00 A.M. Chicago, Ill. .... Salt Lake City, U .... 1,323 .... 1.18‡
8:30 A.M. Chicago, Ill. .... Salt Lake City, U .... 1,323 .... 1.18‡
4:00 P.M. Salt Lake City, U .... Chicago, Ill. .... 1,323 .... 1.03‡
4:00 A.M. Salt Lake City, U .... Chicago, Ill. .... 1,323 .... 1.25‡

9:00 P.M. Salt Lake City, U .... San Francisco, Calif. .... 615 .... 1.06‡
9:30 A.M. Salt Lake City, U .... San Francisco, Calif. .... 615 .... 0.95‡
9:00 A.M. San Francisco, Calif. .... Salt Lake City, U .... 615 .... 1.25‡
8:00 P.M. San Francisco, Calif. .... Salt Lake City, U .... 615 .... 1.16‡


5:00 A.M. New York, N. Y. .... Washington, D. C. .... 210 .... .85
6:00 A.M. New York, N. Y. .... Atlanta, Ga. .... 803 .... .73‡
9:10 P.M. New York, N. Y. .... Atlanta, Ga. .... 803 .... .97‡
8:00 P.M. Atlanta, Ga. .... New York, N. Y. .... 803 .... .97‡
12:45 A.M. Atlanta, Ga. .... New York, N. Y. .... 803 .... .97‡
6:15 P.M. Washington, D. C. .... New York, N. Y. .... 210 .... .85‡

C. A. M. 20. Colonial Western Airways, Inc.

1:00 A.M. Cleveland, Ohio .... Albany, N. Y. .... 463 .... .88‡
6:45 P.M. Albany, N. Y. .... Cleveland, Ohio .... 463 .... .88‡


9:20 A.M. Waco, Tex. .... Galveston, Tex. .... 206 .... .61
4:00 P.M. Galveston, Tex. .... Waco, Tex. .... 206 .... .61


7:45 A.M. Dallas, Tex. .... Brownsville, Tex. .... 547 .... .71
11:45 P.M. Brownsville, Tex. .... Dallas, Tex. .... 547 .... .71

C. A. M. 23. Gulf Coast Airways, Inc.

5:30 A.M. Atlanta, Ga. .... New Orleans, La. .... 488 .... .88‡
1:00 P.M. New Orleans, La. .... Atlanta, Ga. .... 488 .... .70‡

C. A. M. 24. Embry-Riddle Company

8:30 A.M. Chicago, Ill. .... Cincinnati, Ohio .... 274 .... .62‡
9:00 A.M. Chicago, Ill. .... Cincinnati, Ohio .... 274 .... .74‡
4:00 A.M. Cincinnati, Ohio .... Chicago, Ill. .... 274 .... .74‡
5:00 P.M. Cincinnati, Ohio .... Chicago, Ill. .... 274 .... .74‡


6:45 A.M. Atlanta, Ga. .... Miami, Fla. .... 777 .... .93
5:30 P.M. Miami, Fla. .... Atlanta, Ga. .... 777 .... .93
11:05 A.M. Daytona Beach, Fla. .... St. Petersburg, Fla. .... 147 .... .56
4:15 P.M. St. Petersburg, Fla. .... Daytona Beach, Fla. .... 147 .... .56


9:00 A.M. Great Falls, Mont. .... Salt Lake City, U .... 509 .... .61
4:00 A.M. Salt Lake City, U. .... Great Falls, Mont. .... 509 .... .76
2:00 A.M. Pocatello, Idaho. .... Salt Lake City, U. .... 155 .... .71‡
4:00 P.M. Salt Lake City, U. .... Pocatello, Idaho. .... 155 .... .59‡

C. A. M. 27. Thompson Aeronautical Corporation

4:25 P.M. Bay City, Mich. .... Kalamazoo, Mich. .... 151 .... .61
4:25 P.M. Pontiac, Mich. .... Kalamazoo, Mich. .... 151 .... .61
4:45 P.M. Muskegon, Mich. .... Kalamazoo, Mich. .... 89 .... .61
3:00 A.M. Cleveland, Ohio .... Bay City, Mich. .... 251 .... .84‡
11:00 A.M. Cleveland, Ohio .... Detroit, Mich. .... 93 .... .66‡
5:30 A.M. Pontiac, Mich. .... Muskegon, Mich. .... 123 .... .50
5:45 P.M. Kalamazoo, Mich. .... Chicago, Ill. .... 133 .... .69
9:45 A.M. Kalamazoo, Mich. .... Bay City, Mich. .... 131 .... .61
9:45 A.M. Kalamazoo, Mich. .... Pontiac, Mich. .... 172 .... .61
9:45 A.M. Kalamazoo, Mich. .... Muskegon, Mich. .... 90 .... .61
8:15 P.M. Bay City, Mich. .... Cleveland, Ohio .... 87 .... .83‡
9:15 A.M. Detroit, Mich. .... Cleveland, Ohio .... 93 .... .66‡
1:00 A.M. Detroit, Mich. .... Cleveland, Ohio .... 93 .... .66‡
6:30 P.M. Muskegon, Mich. .... Pontiac, Mich. .... 123 .... .74‡
8:30 A.M. Chicago, Ill. .... Kalamazoo, Mich. .... 133 .... .69
8:30 A.M. Chicago, Ill. .... Kalamazoo, Mich. .... 133 .... .34‡
### A. M. 28. Robertson Aircraft Corporation

<table>
<thead>
<tr>
<th>Time</th>
<th>From</th>
<th>To</th>
<th>Distance</th>
<th>Rate (per lb.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:25 A.M.</td>
<td>St. Louis, Mo.</td>
<td>Omaha, Nebr.</td>
<td>404</td>
<td>$0.78</td>
</tr>
<tr>
<td>7:30 P.M.</td>
<td>St. Louis, Mo.</td>
<td>Omaha, Nebr.</td>
<td>404</td>
<td>$0.78</td>
</tr>
<tr>
<td>1:10 A.M.</td>
<td>Omaha, Nebr.</td>
<td>St. Louis, Mo.</td>
<td>404</td>
<td>$0.78</td>
</tr>
<tr>
<td>1:10 P.M.</td>
<td>Omaha, Nebr.</td>
<td>St. Louis, Mo.</td>
<td>404</td>
<td>$0.78</td>
</tr>
</tbody>
</table>

### A. M. 29. Gulf Coast Airways, Inc.

<table>
<thead>
<tr>
<th>Time</th>
<th>From</th>
<th>To</th>
<th>Distance</th>
<th>Rate (per lb.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:30 A.M.</td>
<td>New Orleans, La.</td>
<td>Houston, Tex.</td>
<td>319</td>
<td>$1.00</td>
</tr>
<tr>
<td>8:45 A.M.</td>
<td>Houston, Tex.</td>
<td>New Orleans, La.</td>
<td>319</td>
<td>$1.00</td>
</tr>
</tbody>
</table>

### A. M. 30. Interstate Air Lines, Inc.

<table>
<thead>
<tr>
<th>Time</th>
<th>From</th>
<th>To</th>
<th>Distance</th>
<th>Rate (per lb.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:30 P.M.</td>
<td>Chicago, Ill.</td>
<td>Atlanta, Ga.</td>
<td>623</td>
<td>$0.85</td>
</tr>
<tr>
<td>12:00 P.M.</td>
<td>Atlanta, Ga.</td>
<td>Chicago, Ill.</td>
<td>623</td>
<td>$0.85</td>
</tr>
<tr>
<td>3:30 P.M.</td>
<td>Nashville, Tenn.</td>
<td>Atlanta, Ga.</td>
<td>222</td>
<td>$0.62</td>
</tr>
<tr>
<td>4:33 A.M.</td>
<td>Atlanta, Ga.</td>
<td>Nashville, Tenn.</td>
<td>222</td>
<td>$0.62</td>
</tr>
<tr>
<td>10:50 P.M.</td>
<td>St. Louis, Mo.</td>
<td>St. Louis, Mo.</td>
<td>145</td>
<td>$0.73</td>
</tr>
</tbody>
</table>

### A. M. 31. Discontinued

### A. M. 32. Discontinued

### A. M. 33. Southern Air Fast Express, Inc.

<table>
<thead>
<tr>
<th>Time</th>
<th>From</th>
<th>To</th>
<th>Distance</th>
<th>Rate (per lb.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 A.M.</td>
<td>Atlanta, Ga.</td>
<td>Ft. Worth, Tex.</td>
<td>602</td>
<td>$0.88</td>
</tr>
<tr>
<td>11:25 A.M.</td>
<td>Ft. Worth, Tex.</td>
<td>Atlanta, Ga.</td>
<td>602</td>
<td>$0.88</td>
</tr>
<tr>
<td>8:10 A.M.</td>
<td>Dallas, Tex.</td>
<td>Los Angeles, Calif.</td>
<td>1,215</td>
<td>$0.88</td>
</tr>
<tr>
<td>5:35 A.M.</td>
<td>Los Angeles, Calif.</td>
<td>Dallas, Tex.</td>
<td>1,215</td>
<td>$0.88</td>
</tr>
<tr>
<td>4:55 P.M.</td>
<td>Big Spring, Tex.</td>
<td>San Antonio, Tex.</td>
<td>266</td>
<td>$0.77</td>
</tr>
<tr>
<td>7:30 A.M.</td>
<td>San Antonio, Tex.</td>
<td>Big Spring, Tex.</td>
<td>266</td>
<td>$0.77</td>
</tr>
</tbody>
</table>

### A. M. 34. Transcontinental & Western Air, Inc.

<table>
<thead>
<tr>
<th>Time</th>
<th>From</th>
<th>To</th>
<th>Distance</th>
<th>Rate (per lb.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 A.M.</td>
<td>New York, N. Y.</td>
<td>Kansas City, Mo.</td>
<td>990</td>
<td>$0.39</td>
</tr>
<tr>
<td>6:35 A.M.</td>
<td>Kansas City, Mo.</td>
<td>New York, N. Y.</td>
<td>990</td>
<td>$0.39</td>
</tr>
<tr>
<td>8:30 A.M.</td>
<td>Kansas City, Mo.</td>
<td>Los Angeles, Calif.</td>
<td>1,266</td>
<td>$0.39</td>
</tr>
<tr>
<td>5:00 A.M.</td>
<td>Los Angeles, Calif.</td>
<td>Kansas City, Mo.</td>
<td>1,266</td>
<td>$0.39</td>
</tr>
<tr>
<td>10:58 A.M.</td>
<td>St. Louis, Mo.</td>
<td>Amarillo, Tex.</td>
<td>699</td>
<td>$0.39</td>
</tr>
<tr>
<td>7:57 A.M.</td>
<td>Amarillo, Tex.</td>
<td>St. Louis, Mo.</td>
<td>699</td>
<td>$0.39</td>
</tr>
</tbody>
</table>

### Foreign Air Mail Routes

#### U. S. Post Office Department

<table>
<thead>
<tr>
<th>Route No.</th>
<th>Contractor</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F. A. M. 1</td>
<td>New York, N. Y., via Albany, N. Y., to Montreal, Canada</td>
</tr>
<tr>
<td>2</td>
<td>F. A. M. 2</td>
<td>Seattle, Wash., to Victoria, B. C., and return</td>
</tr>
<tr>
<td>3</td>
<td>F. A. M. 3</td>
<td>New Orleans to Pilottown, La., and return</td>
</tr>
<tr>
<td>4</td>
<td>F. A. M. 4</td>
<td>Miami, Florida, to Havana, Cuba, one way (Cuban mail carried on return trip)</td>
</tr>
</tbody>
</table>
### Pan American Airways, Inc.

122 East 42nd St., New York, N.Y.

**F. A. M. 5** *Long Flight.*—Miami, Florida, via Havana, Cuba; Cozumel, Mexico; Belize, British Honduras; Tela, Republic of Honduras; San Salvador, El Salvador; San Lorenzo, Republic of Honduras; Managua, Nicaragua; Puntarenas, Costa Rica; San José, Costa Rica; David and Panama City, Panama; to Cristobal, Canal Zone, and return. 2,141.5 Miles

**F. A. M. (Extended)**

- Cristobal, Canal Zone; via Cartagena and Barranquilla, Colombia; Maracaibo, Venezuela; Curacao, Dutch West Indies; to Puerto Cabello, Venezuela, and return. 1,058 Miles

**F. A. M. 6** Miami, Florida, via Camaguey, Cuba; Port-au-Prince, Haiti; Santo Domingo, Dom. Rep.; San Juan, Porto Rico; St. Thomas, U. S. V. I.; St. Johns, Antigua, Castries, St. Lucia; Port-of-Spain, Trinidad; Georgetown, British Guiana, to Paramaribo, Dutch Guiana, and return. 2,631 Miles

**F. A. M. 7** Miami, Fla., to Nassau, Bahama Islands (Bahamas mail carried on return trip). 193.5 Miles

**F. A. M. 8** Brownsville, Texas, via Tampico, Mexico, to Mexico City, Mexico. 501 Miles

**F. A. M. 9** Cristobal, Canal Zone, via Buenaventura and Tumaco, Colombia; St. Elena and Guayaquil, Ecuador; Talara, Piura, Pimentel, Trujillo, Lima, Arequipa and Tacna, Peru; Arica, Antofagasta, Ovalle and Santiago, Chile; Mendoza and Buenos Aires, Argentina; to Montevideo, Uruguay, and return. 4,522 Miles

**F. A. M. 10** Paramaribo, Dutch Guiana, via Cayenne, French Guiana; Para, Maranhão, Fortaleza, Natal, Pernambuco, Bahia, Victoria and Rio de Janeiro, Brazil; to Santos, Brazil, and return. 3,619.5 Miles
### POSTAGE RATES

**U. S. Air Mail to Foreign Countries**

Postage (plus fee for air mail service) for each half ounce or fraction is as follows:

<table>
<thead>
<tr>
<th>Country</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>55 cents</td>
</tr>
<tr>
<td>Bahamas</td>
<td>5 cents</td>
</tr>
<tr>
<td>Barbados</td>
<td>20 cents</td>
</tr>
<tr>
<td>Bolivia (by ordinary means from Arequipa)</td>
<td>40 cents</td>
</tr>
<tr>
<td>Brazil</td>
<td>50 cents</td>
</tr>
<tr>
<td>Canal Zone</td>
<td>20 cents</td>
</tr>
<tr>
<td>Chile</td>
<td>50 cents</td>
</tr>
<tr>
<td>Colombia</td>
<td>30 cents</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>20 cents</td>
</tr>
<tr>
<td>Cuba</td>
<td>5 cents</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>10 cents</td>
</tr>
<tr>
<td>Dutch West Indies:</td>
<td></td>
</tr>
<tr>
<td>Curacao, Bonaire, Aruba</td>
<td>30 cents</td>
</tr>
<tr>
<td>Ecuador</td>
<td>30 cents</td>
</tr>
<tr>
<td>Guadeloupe (including Desirade, Les Saintes, Marie Galante, Petite Terre, St. Bartholomew (Barthelémy) and the French Part of St. Martins</td>
<td>20 cents</td>
</tr>
<tr>
<td>Guatemala</td>
<td>15 cents</td>
</tr>
<tr>
<td>Guianas (British, Dutch, French)</td>
<td>30 cents</td>
</tr>
<tr>
<td>Haiti</td>
<td>10 cents</td>
</tr>
<tr>
<td>Honduras (British)</td>
<td>15 cents</td>
</tr>
<tr>
<td>Honduras (Republic of)</td>
<td>15 cents</td>
</tr>
<tr>
<td>Jamaica</td>
<td>10 cents</td>
</tr>
<tr>
<td>Leeward Islands:</td>
<td></td>
</tr>
<tr>
<td>Anguilla, Antigua, Barbuda, Dominica, Montserrat, Nevis, Redonda, St. Christopher, St. Kitts</td>
<td>20 cents</td>
</tr>
<tr>
<td>British Virgin Islands</td>
<td>10 cents</td>
</tr>
<tr>
<td>Martinique</td>
<td>20 cents</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>15 cents</td>
</tr>
<tr>
<td>Panama</td>
<td>55 cents</td>
</tr>
<tr>
<td>Paraguay</td>
<td>40 cents</td>
</tr>
<tr>
<td>Peru</td>
<td>10 cents</td>
</tr>
<tr>
<td>Porto Rico</td>
<td>15 cents</td>
</tr>
<tr>
<td>Salvador (El)</td>
<td>20 cents</td>
</tr>
<tr>
<td>Trinidad</td>
<td>55 cents</td>
</tr>
<tr>
<td>Uruguay</td>
<td>10 cents</td>
</tr>
<tr>
<td>Virgin Islands, U. S.</td>
<td></td>
</tr>
<tr>
<td>Granada, Grenadines, St. Lucia, St. Vincent</td>
<td>20 cents</td>
</tr>
</tbody>
</table>

The rate (postage plus fee for air service) to Canada and Mexico is 5 cents for the first ounce or fraction and 10 cents for each additional ounce or fraction. The above rates include dispatch by the United States domestic air routes, where available, as well as by the international routes, and, in the case of articles for delivery in Canada and Mexico, dispatch by the domestic air routes of Canada and Mexico, respectively, where available.

### McNARY-WATRES ACT

An Act to amend the Air Mail Act of February 2, 1925, as amended by the Acts of June 3, 1926, and May 17, 1928, further to encourage commercial aviation. Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That Section 4 of the Air Mail Act of February 2, 1925, as amended by the Act of June 3, 1926 (44 Stat. 692; U. S. C. Supp. III, title 39, sec. 464), be amended to read as follows:

"Sec. 4. The Postmaster General is authorized to award contracts for the transportation of air mail by aircraft between such points as he may designate to the lowest responsible bidder at fixed rates per mile for definite weight spaces, one cubic foot of space being computed as the equivalent of nine pounds of air mail, such rates not to exceed $1.25 per mile; Provided, That where the air mail moving between the designated points does not exceed twenty-five cubic feet, or two hundred and twenty-five pounds, per trip the Postmaster General may award to the lowest responsible bidder, who has owned and operated an air transportation service on a fixed daily schedule over a distance of not less than two hundred and fifty miles and for a period of not less than six months prior to the advertisement for bids, a contract at a rate not to exceed 40
APPENDIX

513

cents per mile for a weight space of twenty-five cubic feet, or two hundred and twenty-five pounds. Whenever sufficient air mail is not available, first-class mail matter may be added to make up the maximum load specified in such contract."

Sec. 2. That section 6 of the Act of May 17, 1928 (45 Stat. 594; U. S. C., Supp. III, title 39, sec. 465c), be amended to read as follows:

"Sec. 6. The Postmaster General may, if in his judgment the public interest will be promoted thereby, upon the surrender of any air-mail contract, issue, in substitution therefor a route certificate for a period of not exceeding ten years from the date service started under such contract to any contractor or subcontractor who has satisfactorily operated an air-mail route for a period of not less than two years, which certificate shall provide that the holder thereof shall have the right, so long as he complies with all rules, regulations, and orders that may be issued by the Postmaster General for meeting the needs of the Postal Service and adjusting mail operations to the advances in the art of flying and passenger transportation, to carry air mail over the route set out in the certificate or any modification thereof at rates of compensation to be fixed from time to time, at least annually, by the Postmaster General, and he shall publish in his annual report his reasons for the continuance or the modification of any rates:

Provided, That such rates shall not exceed $1.25 per mile. Such certificate may be canceled at any time for willful neglect on the part of the holder to carry out any rules, regulations, or orders made for his guidance, notice of such intended cancellation to be given in writing by the Postmaster General and forty-five days allowed the holder in which to show cause why the certificate should not be canceled."

Sec. 3. That after section 6 of the said Act as amended, additional sections shall be added as follows:

"Sec. 7. The Postmaster General, when in his judgment the public interest will be promoted thereby, may make any extensions or consolidations of routes which are now or may hereafter be established.

"Sec. 8. That the Postmaster General in establishing routes for the transportation of mail by aircraft under this Act may provide service to Canada within one hundred and fifty miles of the international boundary line, over domestic routes which are now or may hereafter be established and may authorize the carrying of either foreign or domestic mail, or both, to and from any points on such routes and make payment for services over such routes out of the appropriation for the domestic air mail service:

Provided, That this section shall not be construed as repealing the authority given by the Act of March 2, 1929, to contract for foreign air mail service.

"Sec. 9. After July 1, 1931, the Postmaster General shall not enter into contracts for the transportation of air mail between points which have not theretofore had such service unless the contract air-mail appropriation proposed to be obligated therewith is sufficient to care for such contracts, and all other obligations against such appropriation without incurring a deficiency therein."

Approved, April 29, 1930.

RESOLUTION ON FUEL MARKETING PRACTICES

WHEREAS, the Advertising, Sales and Ethics Committee of the Fuel and Lubricants Section of the Aeronautical Chamber of Commerce recommends:

1. That the Chamber and all its members accept in full the Code of Marketing Practices adopted by the American Petroleum Institute.

2. That the member companies do not donate lubricating oil or aviation gasoline to individual operators except that said companies may donate their products to engine manufacturers and airline operators for test to secure the approval of their products.

3. That the member companies do not pay monies, grant special discounts or furnish free advertising for the exclusive right to market aviation products at an airport.

4. That no member company make any donation of monies, prices or products in connection with a flying project unless the ships are owned and/or chartered by a member company in which case the ships are to be considered under direct control of said company.

5. That no member company carry direct newspaper or display advertising strictly for the benefit of airport operators and/or persons not connected with the member company carrying said advertising, provided, however, that where a member company advertises its own products, mention may be made therein that certain fields, operators and/or persons are using their products.

NOW THEREFORE RESOLVED that the foregoing recommendations of said Committee be and hereby are adopted.
The following is a list of the states which considered aeronautical legislation during the 1929-30 sessions, showing the number of bills introduced, laws enacted and bills defeated in each state. The list was prepared by the Legal and Legislative Research Service of the Aeronautical Chamber of Commerce.

<table>
<thead>
<tr>
<th>Character of Legislation</th>
<th>Favorable Action</th>
<th>Unfavorable Action</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>AIRPORT ENABLING ACTS</td>
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<tr>
<td>1. Kentucky</td>
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<td>1</td>
</tr>
<tr>
<td>2. Louisiana</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3. Massachusetts</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>4. New York</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>5. South Carolina</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6. Tennessee</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>7. Virginia</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>LICENSING BILLS</td>
<td></td>
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</tr>
<tr>
<td>1. Kentucky</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2. Louisiana</td>
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<td>1</td>
</tr>
<tr>
<td>3. New Jersey</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4. New York</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5. South Carolina</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>6. Virginia</td>
<td>1</td>
<td>0</td>
<td>1</td>
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<tr>
<td>AIR TRAFFIC RULES</td>
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</tr>
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</tr>
<tr>
<td>2. New York</td>
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<td>3</td>
<td>4</td>
</tr>
<tr>
<td>REGULATORY BODIES</td>
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</tr>
<tr>
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<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2. Mississippi</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3. New Jersey</td>
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<td>2</td>
</tr>
<tr>
<td>4. New York</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
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<td>5. Tennessee</td>
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<td>0</td>
<td>1</td>
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<tr>
<td>AVIATION SCHOOLS</td>
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<tr>
<td>1. New York</td>
<td></td>
<td>0</td>
<td>2</td>
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<tr>
<td>LIABILITY</td>
<td></td>
<td></td>
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<tr>
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</tr>
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<td>2. Massachusetts</td>
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</tr>
<tr>
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<td></td>
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<td>TAXATION</td>
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<td></td>
</tr>
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<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2. Mississippi</td>
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<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3. South Carolina</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4. Virginia</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>MISCELLANEOUS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2. Louisiana</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3. Massachusetts</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. New York</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. Rhode Island</td>
<td>0</td>
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<td>2</td>
</tr>
<tr>
<td>6. Texas</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Total: 25 Favorable, 36 Unfavorable, 61 Total
AVIATION GASOLINE TAX SUMMARY

The following is a summary of gasoline tax laws as they apply to aviation in the several states. The list was prepared by the Legal and Legislative Research Service of the Aeronautical Chamber of Commerce.

<table>
<thead>
<tr>
<th>State</th>
<th>Tax</th>
<th>Disposition of Receipts</th>
<th>Applicable to Aircraft Fuel</th>
<th>Exemption or Refund</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Arizona</td>
<td>3¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Arkansas</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>California</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Colorado</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Connecticut</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Delaware</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Dist. of Columbia</td>
<td>4¢</td>
<td>Roads and Schools</td>
<td>Except in inter-state flying</td>
<td>No</td>
</tr>
<tr>
<td>Florida</td>
<td>4¢</td>
<td>Highways and Airports</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Georgia</td>
<td>5¢</td>
<td>Roads and Schools</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Idaho</td>
<td>5¢</td>
<td>Air fuel tax to aero fund</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Illinois</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Iowa</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Kansas</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Kentucky</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Louisiana</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Fed. Gov't only</td>
</tr>
<tr>
<td>Maine</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund of 1/2 of tax</td>
</tr>
<tr>
<td>Maryland</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Michigan</td>
<td>4¢</td>
<td>Highways and Airports</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Minnesota</td>
<td>5¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Mississippi</td>
<td>5¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Missouri</td>
<td>3¢</td>
<td>Highways</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Montana</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Nebraska</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Nevada</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>4¢</td>
<td>Highways and Waterways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>New Jersey</td>
<td>3¢</td>
<td>Highways and Waterways</td>
<td>No</td>
<td>Exemption</td>
</tr>
<tr>
<td>New Mexico</td>
<td>5¢</td>
<td>Highways</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>New York</td>
<td>3¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>North Carolina</td>
<td>5¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>North Dakota</td>
<td>3¢</td>
<td>Highways</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Ohio</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Oregon</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>South Carolina</td>
<td>6¢</td>
<td>Highways</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>South Dakota</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Tennessee</td>
<td>4¢</td>
<td>Highways exceed $10,000 to airways</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Texas</td>
<td>4¢</td>
<td>Highways, Schools</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Utah</td>
<td>3¢</td>
<td>Highways</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Vermont</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Virginia</td>
<td>4¢</td>
<td>Highways, Bridges</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Washington</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>West Virginia</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>Refund</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>4¢</td>
<td>Highways</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Wyoming</td>
<td>4¢</td>
<td>Highways 3</td>
<td>Yes</td>
<td>No</td>
</tr>
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</table>

AERONAUTICAL EDUCATION IN AMERICAN UNIVERSITIES AND COLLEGES

The following table of statistics on aeronautical education in American universities and colleges was compiled from the second annual survey on Aeronautical Education made by the Aeronautical Chamber of Commerce for "The Aircraft Year Book". Those starred (*) offer full courses leading to a degree in aeronautical engineering.

<table>
<thead>
<tr>
<th>Name of Institution</th>
<th>Number Instructors Full Time</th>
<th>Number Instructors Part Time</th>
<th>Number Students Enrolled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama Polytechnic Institute</td>
<td>1</td>
<td>0</td>
<td>46</td>
</tr>
<tr>
<td>University of Alabama *</td>
<td>1</td>
<td>3</td>
<td>46</td>
</tr>
<tr>
<td>University of Arizona</td>
<td>0</td>
<td>1</td>
<td>35</td>
</tr>
</tbody>
</table>

Faculty on Flight Training
<table>
<thead>
<tr>
<th>Name of Institution</th>
<th>Number Full-Time Instructors</th>
<th>Number Part-Time Instructors</th>
<th>Number Students Enrolled</th>
<th>Faculty Attitude on Flight Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Arkansas</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Armour Institute of Technology</td>
<td>0</td>
<td>4</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Bradley Polytechnic Institute</td>
<td>1</td>
<td>0</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>University of Buffalo</td>
<td>1</td>
<td>5</td>
<td>50</td>
<td>Favorable</td>
</tr>
<tr>
<td>California Institute of Technology</td>
<td>3</td>
<td>4</td>
<td>15</td>
<td></td>
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<tr>
<td>University of California</td>
<td>9</td>
<td>3</td>
<td>80</td>
<td>Favorable</td>
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<td>110</td>
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<td>Cornell University</td>
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 Totals: 63 215 3,593 22 Favorable
## DEPARTMENT OF COMMERCE

**Aeronautics Branch**  
Washington, D. C.

Clarence M. Young, Assistant Secretary of Commerce for Aeronautics

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- Gilbert G. Budwig  
- Chief, Inspection Section
- W. Fiske Marshall  
- Chief, Licensing Division
- Dr. Harold J. Cooper  
- Chief, Medical Section
- Richard C. Gazley  
- Chief, Engineering Section
- Elmer McD. Kintz  
- Chief, Enforcement Section

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- Acting Chief, Editorial Section

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- Airways Engineer
- C. J. Stanton  
- Airports Engineer
- L. W. Lawrence  
- Administrative Officer
- H. J. Walls  
- Radio Engineer
- Eugene Sibley  
- Chief, Weather and Communications Section
- A. J. La Baie  
- Chief, Construction Section
- W. T. Miller  
- Supt. Airways Extension

### Air Mapping Section (Coast and Geodetic Survey)
Raymond L. Ross  
Chief, Air Mapping Section

### Aeronautical Research Division (Bureau of Standards)
Dr. L. J. Briggs  
Chief, Aeronautical Research

## AIRCRAFT HAVING APPROVED TYPE CERTIFICATES

**December 31, 1930**

**KEY:** P—Place; O—Open; C—Closed; L—Landplane; S—Seaplane; Am—Amphibian; FB—Flying boat; B—Biplane; M—Monoplane; –—No longer manufactured.

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<th>Airplane</th>
<th>Weight Empty</th>
<th>Weight Load</th>
<th>Useful Gross</th>
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<td>Alexander &quot;Combination Wing Eaglerock,&quot; 3POLB, OX5, 90 h.p. or OXX6, 100 h.p.</td>
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<td>Advance Waco 9, 3POLB, OX5 90 h.p. or OXX6 102 h.p.</td>
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<td>Bulb Airselan, 7PCLB, WW 220 h.p.</td>
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<td>Briggs Dart 2POLB, Ansanti 3A-3 35 h.p.</td>
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<td>Mono Aircraft Monocoupe, 2PCLM, Vellie 55</td>
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<td>Spartan C-2, 3PLOB, RH-12, 128 h.p.</td>
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<td>Cessna AW, 1PCLM, Warner 110 h.p.</td>
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<td>Spartan C-120, 2PLOB, Walter 120 h.p.</td>
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<td>Stinson SM-1DA, 6PCLM, J5 220 h.p.</td>
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<td>Fairchild PC-2, 3PCLM, Challenger 185 h.p.</td>
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<td>Consolidated PT-3 and PT-3A, 2PLOB, WW 220 h.p.</td>
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<td>Hamilton H-43, 8PCLM, Wasp 450 h.p.</td>
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<td>Laird LC-8, 3PLOB, WW 220 h.p.</td>
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<td>Ford 4-AT-B, 14PCLM, Wright J5's @ 220 h.p.</td>
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<td>Fairchild KR-34-B (Formerly Kreider Reiner C-4-1ART) 3PLOB, Comet 120 h.p.</td>
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<td>Fairchild Model 71, 7PCL-5SM, Wasp 420 h.p. (Fairchild P-6 Floats)</td>
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<td>Pitts Special, 1-3PLOB, WW 230 h.p.</td>
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<td>Lockheed Vega Model 8, 5PCLM, (Edo K Floats) Wasp 420 h.p.</td>
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<td>Beech (Hamilton Metalplane Division) H-47, 8 PCLM, or 7FCSM Hornet 525 h.p.</td>
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<td>Mohawk Pinto MLV, 2PCLM, Vellie 55 h.p.</td>
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<td>Polkner AFX, 14PCLM, 3 Wasps @ 420 h.p.</td>
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<td>DeLong Model, 8PCLM, 3 Wasps @ 420 h.p.</td>
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<td>Br summar-Winkle Bird A, 3PLOB, OX 90 h.p.</td>
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<td>Mahoney-Ryan B-3, 6PCLM, WW 220 h.p.</td>
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† Note: Empty weight does not include tools or airwheel installation. (Total weight airwheel installation 145 lbs.)
‡ Empty weight does not include landing lights, flares, battery or generator.
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<td>Ford 4-AT-E, 14PCL-M, 3 Wright R-975’s @ 600 h.p.</td>
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<tr>
<td>140</td>
<td>6-15-29</td>
<td>Curtiss-Wright Travel Air S-600-B, 3POLB, R-975 300 h.p.</td>
<td>1,500</td>
<td>2,420</td>
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</tr>
<tr>
<td>141</td>
<td>6-15-29</td>
<td>Alexander A-12, 3POLB, Comet 130 h.p.</td>
<td>1,627</td>
<td>2,580</td>
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<tr>
<td>142</td>
<td>6-15-29</td>
<td>Alexander A-13, 3POLB, Challenger 170 h.p.</td>
<td>1,705</td>
<td>2,650</td>
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<tr>
<td>143</td>
<td>6-15-29</td>
<td>Ryan B-5, 3POLB, Wright R-975 300 h.p.</td>
<td>1,505</td>
<td>2,478</td>
<td></td>
</tr>
<tr>
<td>144</td>
<td>6-15-29</td>
<td>Curtiss-Wright Travel Air B-4000, 3POLB, R-975 300 h.p.</td>
<td>1,505</td>
<td>2,478</td>
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<tr>
<td>145</td>
<td>6-15-29</td>
<td>Curtiss-Wright Travel Air B-4000, 3POLB, R-975 300 h.p.</td>
<td>1,505</td>
<td>2,478</td>
<td></td>
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<tr>
<td>146</td>
<td>6-15-29</td>
<td>Curtiss-Wright Travel Air B-4000, 3POLB, R-975 300 h.p.</td>
<td>1,505</td>
<td>2,478</td>
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<tr>
<td>147</td>
<td>6-15-29</td>
<td>Curtiss-Wright Travel Air B-4000, 3POLB, R-975 300 h.p.</td>
<td>1,505</td>
<td>2,478</td>
<td></td>
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<tr>
<td>148</td>
<td>6-15-29</td>
<td>Curtiss-Wright Travel Air B-4000, 3POLB, R-975 300 h.p.</td>
<td>1,505</td>
<td>2,478</td>
<td></td>
</tr>
<tr>
<td>149</td>
<td>6-15-29</td>
<td>Curtiss-Wright Travel Air B-4000, 3POLB, R-975 300 h.p.</td>
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<td>2,478</td>
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<tr>
<td>150</td>
<td>6-15-29</td>
<td>Curtiss-Wright Travel Air B-4000, 3POLB, R-975 300 h.p.</td>
<td>1,505</td>
<td>2,478</td>
<td></td>
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<tr>
<td>151</td>
<td>6-15-29</td>
<td>Command-Aire 3C-3 Trainer, 3POLB, OX-5</td>
<td>1,439</td>
<td>2,109</td>
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<tr>
<td>152</td>
<td>6-15-29</td>
<td>Command-Aire 3C-3A Trainer, 2POLB, Warner (B) Edo Floats, 3PCL-M, 1PCL-M, 2Wasps @ 420</td>
<td>1,284</td>
<td>1,990</td>
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<tr>
<td>153</td>
<td>6-15-29</td>
<td>Laird LCR, 3POLB, Wright J5 220 h.p.</td>
<td>1,843</td>
<td>2,914</td>
<td></td>
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</tbody>
</table>

**Note:** Empty weight does not include battery and starters, total 96 lbs.

**Note:** Approximate; will vary with fuel capacity and cabin arrangement.
<table>
<thead>
<tr>
<th>A.T.C. No.</th>
<th>Date</th>
<th>Airplane</th>
<th>Weight</th>
<th>Useable</th>
<th>Gross</th>
</tr>
</thead>
<tbody>
<tr>
<td>154</td>
<td>5-31-29</td>
<td>International F-17-W, 3POLB, Wright J5 220</td>
<td>1,780</td>
<td>2,700</td>
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<tr>
<td>155</td>
<td>5-31-29</td>
<td>International F-17-H, 3POLB, Hisso 150-180</td>
<td>1,755</td>
<td>2,700</td>
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<tr>
<td>156</td>
<td>6-4-29</td>
<td>Stout (Ford) 5-AT-B, 12-127CLM, 3 Wasp @ 450 b.p.</td>
<td>7,576</td>
<td>13,250</td>
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<tr>
<td>157</td>
<td>6-6-29</td>
<td>Boeing 204, 6PCFB, Wasp 450 b.p.</td>
<td>3,371</td>
<td>5,000</td>
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<tr>
<td>158</td>
<td>6-10-29</td>
<td>Sikorsky S-38-C, 12PCAMB, 2 Wasp @ 420</td>
<td>6,490</td>
<td>13,480</td>
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<tr>
<td>159</td>
<td>6-10-29</td>
<td>Curtiss Thrush, 6PCLM, Challenger 170 h.p.</td>
<td>2,232</td>
<td>3,700</td>
<td></td>
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<tr>
<td>160</td>
<td>6-10-29</td>
<td>Curtiss Thrush, 6PCLM, Challenger 170 h.p.</td>
<td>2,232</td>
<td>3,700</td>
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<tr>
<td>161</td>
<td>6-11-29</td>
<td>Sunson SM-2-AB, 4PCLM, Wright J5 975</td>
<td>1,907</td>
<td>1,875</td>
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<tr>
<td>162</td>
<td>6-11-29</td>
<td>Fairchild KR-34-C, 3POLB R-540 165 h.p.</td>
<td>1,524</td>
<td>5,000</td>
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<td>163</td>
<td>6-12-29</td>
<td>Buhl CA-3-D, 3POLB, Wright R-975 300 h.p.</td>
<td>2,017</td>
<td>3,200</td>
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<tr>
<td>164</td>
<td>6-29-29</td>
<td>Fokker Standard Universal, 7CLM, R-975</td>
<td>300 h.p.</td>
<td>4,200</td>
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<tr>
<td>165</td>
<td>6-14-29</td>
<td>Ford 5-AT-C, 1PCLM, 3 Wasp @ 420 h.p.</td>
<td>7,990</td>
<td>13,200</td>
<td></td>
</tr>
<tr>
<td>166</td>
<td>6-21-29</td>
<td>Viking B-4, 3POLB, Kinner K5 90 h.p.</td>
<td>1,307</td>
<td>1,375</td>
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<tr>
<td>167</td>
<td>6-25-29</td>
<td>Curtiss Thrush, 6PCLM, Challenger 170 h.p.</td>
<td>2,232</td>
<td>3,700</td>
<td></td>
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<tr>
<td>168</td>
<td>7-2-29</td>
<td>Bach 3-CT-8, 10PCLM, 2 R-540's and 1 Hornet</td>
<td>855 h.p.</td>
<td>7,980</td>
<td></td>
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<tr>
<td>169</td>
<td>7-26-29</td>
<td>Stigle (Ford) 7AT, 1ATCLM, 3 R-815 %</td>
<td>7,048</td>
<td>12,144</td>
<td></td>
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<tr>
<td>170</td>
<td>7-10-29</td>
<td>Nicholas-Beazley NB-3, 3POLM, LeBlond 65 h.p.</td>
<td>744</td>
<td>1,375</td>
<td></td>
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<tr>
<td>171</td>
<td>7-10-29</td>
<td>Curtiss Wright Travel Air SA-6000-A, 6PCFbB, Wasp 450 h.p.</td>
<td>3,676</td>
<td>5,500</td>
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<tr>
<td>172</td>
<td>7-17-29</td>
<td>Laird LCR-300, 3POLB, Wright R-975 300 h.p.</td>
<td>1,922</td>
<td>3,010</td>
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<tr>
<td>173</td>
<td>7-19-29</td>
<td>Cunningham-Hall PT-6, 6PCLM, Wright R-975</td>
<td>300 h.p.</td>
<td>4,350</td>
<td></td>
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<tr>
<td>174</td>
<td>7-26-29</td>
<td>Alliance &quot;Argo,&quot; 2POLB, Hess Warrior 115 h.p.</td>
<td>1,077</td>
<td>1,915</td>
<td></td>
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<tr>
<td>175</td>
<td>7-26-29</td>
<td>serial 103 and up, with 8 gal. reserve fuel tanks</td>
<td>1,055</td>
<td>1,971</td>
<td></td>
</tr>
<tr>
<td>176</td>
<td>7-26-29</td>
<td>Parks P-I, 3POLB, OX-5 90 h.p.</td>
<td>1,332</td>
<td>2,078</td>
<td></td>
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<tr>
<td>177</td>
<td>7-26-29</td>
<td>Vimy Legate, 2POLM, Kinner K5 90 h.p.</td>
<td>747</td>
<td>1,295</td>
<td></td>
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<tr>
<td>178</td>
<td>7-26-29</td>
<td>Lincoln PT, 2POLB, OX-5 90 h.p.</td>
<td>1,428</td>
<td>2,200</td>
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<tr>
<td>179</td>
<td>7-26-29</td>
<td>Curtiss Fledgling Junior, 2POLB, Challenger</td>
<td>170 h.p.</td>
<td>2,500</td>
<td></td>
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<tr>
<td>180</td>
<td>7-26-29</td>
<td>Boeing 40-B4, 1PCLM, Hornet 325 h.p.</td>
<td>3,809</td>
<td>6,680</td>
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<tr>
<td>181</td>
<td>7-27-29</td>
<td>Boeing 40-B4, 1PCLM, Hornet Multiplane</td>
<td>3,709</td>
<td>6,680</td>
<td></td>
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<tr>
<td>182</td>
<td>7-27-29</td>
<td>Command-Aire 5-C-3, 3POL-SB, Challenger</td>
<td>176 h.p.</td>
<td>3,850</td>
<td></td>
</tr>
<tr>
<td>183</td>
<td>7-27-29</td>
<td>(Eau De Luxe Floats) Seaplane</td>
<td>1,482</td>
<td>3,850</td>
<td></td>
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<tr>
<td>184</td>
<td>7-27-29</td>
<td>Command-Aire 3-C-3A, 3POLM, Hisso 150 h.p.</td>
<td>1,664</td>
<td>3,240</td>
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<tr>
<td>185</td>
<td>7-30-29</td>
<td>Swallow TP-E, 3POLB, Kinner 890 h.p.</td>
<td>1,470</td>
<td>2,180</td>
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<tr>
<td>186</td>
<td>7-30-29</td>
<td>Steamman LT-1, 1PCLM, Hornet 525 h.p.</td>
<td>3,890</td>
<td>6,250</td>
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<tr>
<td>187</td>
<td>7-30-29</td>
<td>Curtiss-Wright Travel Air E-4000, 3POLB, Wright R-940 165 h.p.</td>
<td>1,695</td>
<td>2,702</td>
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<tr>
<td>188</td>
<td>7-31-29</td>
<td>Travel Air BC-4000, 3POLB, Challenger 170 h.p.</td>
<td>1,793</td>
<td>2,500</td>
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<tr>
<td>189</td>
<td>7-31-29</td>
<td>Alexander A-15, 3POLB, Kinner K5 100 h.p.</td>
<td>1,231</td>
<td>2,261</td>
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<tr>
<td>190</td>
<td>8-2-29</td>
<td>Curtiss Fledgling, 2POLB, Challenger 170 h.p.</td>
<td>1,900</td>
<td>2,685</td>
<td></td>
</tr>
<tr>
<td>191</td>
<td>8-2-29</td>
<td>(With modifications for military planes)</td>
<td>696</td>
<td>2,701</td>
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</tr>
<tr>
<td>192</td>
<td>8-2-29</td>
<td>Metal Aircraft 62W Flamingo, 8PCLM Wasp</td>
<td>3,370</td>
<td>5,800</td>
<td></td>
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<tr>
<td>193</td>
<td>10-23-29</td>
<td>Curtiss Condor CO, 21PCLB, 2 Geared Com, GV-1570 @ 600 h.p.</td>
<td>2,430</td>
<td>5,800</td>
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<tr>
<td>194</td>
<td>8-9-29</td>
<td>Stinson SM-2AC, 4PCLM, Wright R-760 225 b.p.</td>
<td>6,326</td>
<td>27,000</td>
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<tr>
<td>195</td>
<td>9-9-29</td>
<td>Spartan G-10-195, 3POLB, Wright R-540 165 h.p.</td>
<td>1,050</td>
<td>2,618</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** Empty weight does not include storage, battery and starters. Total 95 lbs.

** friedman:** Apparatus will vary with fuel capacity and cabin arrangement.

** NOTE:** Weight empty includes 91 lbs. of equipment.
<table>
<thead>
<tr>
<th>A.T.C. No.</th>
<th>Date Issued</th>
<th>Airplane</th>
<th>Weight Empty</th>
<th>Useful Load</th>
<th>Gross Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>196</td>
<td>8-13-29</td>
<td>Pitts-Pa-78 Sport, 3POLB, Wright R-760</td>
<td>1,821</td>
<td>1,129</td>
<td>2,050</td>
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<tr>
<td></td>
<td></td>
<td>Pitts PA-7M Mail, 1POLB, Wright R-760</td>
<td>225 h.p.</td>
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<tr>
<td>197</td>
<td>8-16-29</td>
<td>Moth 60-GM and 60-GMW, 2POLB (Edeo H Floats) DH Gipsy 85 or Wright Gipsy 60 h.p.</td>
<td>1,821</td>
<td>1,220</td>
<td>3,050</td>
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<tr>
<td></td>
<td></td>
<td>Landplane.</td>
<td>1,045</td>
<td>605</td>
<td>1,650</td>
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<tr>
<td>198</td>
<td>8-15-29</td>
<td>New Standard D-29, 2POLB, Cirrus Mark 11</td>
<td>1,097</td>
<td>535</td>
<td>1,632</td>
</tr>
<tr>
<td>199</td>
<td>8-16-29</td>
<td>Crown B-3, 2POLB, Kinney 90 h.p.</td>
<td>1,243</td>
<td>513</td>
<td>1,756</td>
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<tr>
<td>200</td>
<td>8-16-29</td>
<td>Detroit Ryan Speedster F-2 (Formerly Parks P-2), 3POLB, Axelson 115 h.p.</td>
<td>1,520</td>
<td>920</td>
<td>2,440</td>
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<tr>
<td>201</td>
<td>8-16-29</td>
<td>Mono Aircraft Monocoach, 4PCLM, Wright J5</td>
<td>1,173</td>
<td>3,002</td>
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<tr>
<td>202</td>
<td>8-16-29</td>
<td>Golden Eagle Chief, 2POLB, LeBlond 65 h.p.</td>
<td>926</td>
<td>513</td>
<td>1,479</td>
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<tr>
<td>203</td>
<td>8-23-29</td>
<td>Aeromarine Klemn AKL-26, 2POLSM, Le-Blond 5 D5 h.p. (Edeo H Floats)</td>
<td>920</td>
<td>500</td>
<td>1,440</td>
</tr>
<tr>
<td>204</td>
<td>8-23-29</td>
<td>Aeromarine Klemn AKL-26-A, 2POLSM, LeBlond 65 h.p. (Edeo H Floats and Kaunier Floats)</td>
<td>1,025</td>
<td>565</td>
<td>1,550</td>
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<tr>
<td>205</td>
<td>8-17-29</td>
<td>Boeing 80-A and 80-AI, 13-20PCLB 3, Hornets Seaplane</td>
<td>1,106</td>
<td>500</td>
<td>1,606</td>
</tr>
<tr>
<td>206</td>
<td>8-20-29</td>
<td>Boeing, 80-A and 80-AI, 13-20PCLB 3, Hornets</td>
<td>920</td>
<td>500</td>
<td>1,440</td>
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<tr>
<td>207</td>
<td>8-19-29</td>
<td>Cessna DC-6, 4PCLM, Challenger 170 h.p.</td>
<td>1,767</td>
<td>2,988</td>
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<tr>
<td>208</td>
<td>8-20-29</td>
<td>Fairchild KR-34-A (Formerly Kreider Renner Model KR-74-D), 3POLB, Challenger 185 h.p.</td>
<td>1,462</td>
<td>1,071</td>
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<tr>
<td>209</td>
<td>8-22-29</td>
<td>Command-Aire 3C-3B Trainer, 2POLB, SH-14</td>
<td>1,090</td>
<td>1,071</td>
<td></td>
</tr>
<tr>
<td>210</td>
<td>8-23-29</td>
<td>General 152-E, 1PCLM, Wright R-540 105 h.p.</td>
<td>1,340</td>
<td>682</td>
<td>2,022</td>
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<tr>
<td>211</td>
<td>8-24-29</td>
<td>Boeing 200-A, 3POLB, R-540 105 h.p.</td>
<td>1,324</td>
<td>776</td>
<td>2,300</td>
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<tr>
<td>212</td>
<td>8-24-29</td>
<td>Stimson SM-1FS, 6PCLM, Wright R-975 300 h.p. (Edeo K Floats)</td>
<td>3,198</td>
<td>1,502</td>
<td></td>
</tr>
<tr>
<td>213</td>
<td>8-26-29</td>
<td>Curtiss Falcon, 2POLB, Geared Conqueror 600 h.p.</td>
<td>3,567</td>
<td>1,898</td>
<td></td>
</tr>
<tr>
<td>214</td>
<td>8-26-29</td>
<td>Command-Aire 3C-3B, 3POLB, Axelson 115 h.p.</td>
<td>1,503</td>
<td>869</td>
<td>2,372</td>
</tr>
<tr>
<td>215</td>
<td>8-26-29</td>
<td>Fairchild KR-21 (Formerly Kreider Reiner C6B), 2POLB, Kinney K5 160 h.p.</td>
<td>1,668</td>
<td>535</td>
<td>1,693</td>
</tr>
<tr>
<td>216</td>
<td>8-28-29</td>
<td>New Standard D-29-A, 2POLB, Kinney 160 h.p.</td>
<td>1,165</td>
<td>625</td>
<td>1,790</td>
</tr>
<tr>
<td>217</td>
<td>8-28-29</td>
<td>Stimson SM-6B, 8PCLM, Wasp 480 h.p.</td>
<td>3,496</td>
<td>1,854</td>
<td></td>
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<tr>
<td>218</td>
<td>8-30-29</td>
<td>Mono Aircraft Monoprep, 2POLM, Velle 55 h.p.</td>
<td>783</td>
<td>595</td>
<td></td>
</tr>
<tr>
<td>219</td>
<td>9-4-29</td>
<td>Keystone K-84 Commuter, 4PCLM, Wright R-975 300 h.p.</td>
<td>2,020</td>
<td>1,230</td>
<td></td>
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<tr>
<td>220</td>
<td>9-5-29</td>
<td>Curtiss-Robertson Robin Jr, 3PCLM, Wright R-850 165 h.p. (Edeo DeLuxe Floats) Robin Jr, 3PCLM,</td>
<td>1,625</td>
<td>868</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>R-840 165 h.p. (DeLuxe Equipment) Robin Jr, 3PCLM,</td>
<td>1,790</td>
<td>870</td>
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<tr>
<td>221</td>
<td>9-5-29</td>
<td>Curtiss-Robertson Robin Jr, 3PCLM, Wright R-840 165 h.p.</td>
<td>1,633</td>
<td>808</td>
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<tr>
<td>222</td>
<td>9-5-29</td>
<td>Pokker AF-X1, SPACAM M Cyclone 525 h.p.</td>
<td>4,179</td>
<td>2,439</td>
<td></td>
</tr>
<tr>
<td>223</td>
<td>9-5-29</td>
<td>Kreutzke K5, 5PCLM, 3 Kinners @ 96 h.p.</td>
<td>2,743</td>
<td>1,608</td>
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<tr>
<td>224</td>
<td>9-7-29</td>
<td>New Standard D-25-A, 2POLB, Wright R-760</td>
<td>2,955</td>
<td>1,290</td>
<td></td>
</tr>
<tr>
<td>225</td>
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<td>New Standard D-26-A, 3POLB, Wright R-760</td>
<td>2,955</td>
<td>1,345</td>
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<td>226</td>
<td>9-7-29</td>
<td>New Standard D-27-A, 1POLB, Wright R-760</td>
<td>2,955</td>
<td>1,345</td>
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<tr>
<td>227</td>
<td>9-12-29</td>
<td>Lockheed Wasp Vega 5-B, 7PCLM, Wasp 480 h.p.</td>
<td>2,490</td>
<td>1,775</td>
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<td>(Edeo K Floats) 5-B, 7PCLM, Wasp 480 h.p.</td>
<td>2,490</td>
<td>1,775</td>
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<td>228</td>
<td>9-17-29</td>
<td>Great Lakes 2T-1A, 1-2POLB, American Cirrus 90 h.p.</td>
<td>1,902</td>
<td>578</td>
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<td>229</td>
<td>9-17-29</td>
<td>General 161-C, 2POLM, Warner 170 h.p.</td>
<td>1,206</td>
<td>535</td>
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<td>230</td>
<td>9-18-29</td>
<td>Nicholas-Beasley, NBV, 3POLM, Velie 65 h.p.</td>
<td>772</td>
<td>629</td>
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<td>231</td>
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<td></td>
<td></td>
<td>Without Oil Radiator, 3POLM, Velie 65 h.p.</td>
<td>735</td>
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<td>232</td>
<td>9-18-29</td>
<td>Rearwin 2000-C, 3POLB, Challenger 170 h.p.</td>
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<td>233</td>
<td>9-18-29</td>
<td>Command-Aire 5C-3C, 3POLB, Wright R-540</td>
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<td>931</td>
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<td></td>
<td>165 h.p.</td>
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## APPENDIX

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<tr>
<th>A.T.C. No.</th>
<th>Date Issued</th>
<th>Airplane</th>
<th>Weight Empty</th>
<th>Useful Load</th>
<th>Gross Weight</th>
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<td>233</td>
<td>9-27-29</td>
<td>Fokker AF-XIV, 1, 7, or 9 PCLM, Hornet 525</td>
<td>4,366</td>
<td>2,585</td>
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<td>Mercury Tri-2, 2 PCLM, LeBlond 90 h.p.</td>
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<td>1,513</td>
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<td>239</td>
<td>9-25-29</td>
<td>Curtiss Thrush &quot;J,&quot; 6 PCLM, Wright R-760</td>
<td>2,220</td>
<td>1,540</td>
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<td>237</td>
<td>9-25-29</td>
<td>Curtiss Carrier Pigeon, 1 POLB, Geared Conq.</td>
<td>600 h.p.</td>
<td>4,210</td>
<td>3,300</td>
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<td>238</td>
<td>9-26-29</td>
<td>Swallow 2-W, 2 PCLM, Warner 110 h.p. (See Eng. Memo.)</td>
<td>715</td>
<td>627</td>
<td>1,770</td>
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<td>239</td>
<td>9-26-29</td>
<td>Brunner-Winkle Bird BK, 3 PCLM, Kinner 90 h.p.</td>
<td>1,199</td>
<td>781</td>
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<td>240</td>
<td>9-30-29</td>
<td>Waco CSO, 3 PCLM (Edeo M Floats) Wright R-760 240 h.p.</td>
<td>1,628</td>
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<td>241</td>
<td>9-28-29</td>
<td>Morel M-1, 3 PCLM, J 522 h.p.</td>
<td>2,000</td>
<td>928</td>
<td>2,828</td>
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<td>Fairchild Model 42, 4 PCLM, R-755 300 h.p.</td>
<td>2,676</td>
<td>1,570</td>
<td>4,246</td>
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<td>Cessna DC-6 A, 4 PCLM, Wright R-755 300 h.p.</td>
<td>1,932</td>
<td>1,248</td>
<td>3,180</td>
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<td>9-29-29</td>
<td>Cessna DC-6B, 4 PCLM, Wright R-760 240 h.p.</td>
<td>1,871</td>
<td>1,229</td>
<td>3,100</td>
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<td>245</td>
<td>9-30-29</td>
<td>Bellanca PM-300, 4 PCLM, Wright R-755 300 h.p.</td>
<td>2,290</td>
<td>2,310</td>
<td>4,600</td>
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<td>9-30-29</td>
<td>Ford 74T, 1 PCLM, 2 Wright R-755's @ 300 h.p.</td>
<td>7,380</td>
<td>5,500</td>
<td>12,010</td>
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<td>247</td>
<td>10-2-29</td>
<td>Doyle 2, 2 PCLM, LeBlond 65 h.p.</td>
<td>792</td>
<td>529</td>
<td>4,322</td>
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<td>248</td>
<td>10-4-29</td>
<td>Ireland NaC, 3 PO-Camb, P&amp;W Wasp 450 h.p.</td>
<td>1,354</td>
<td>1,200</td>
<td>3,800</td>
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<td>249</td>
<td>10-4-29</td>
<td>Mono Aircraft Monosport 1, 2 PCLM, Warner 110 h.p.</td>
<td>1,056</td>
<td>594</td>
<td>1,650</td>
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<td>250</td>
<td>10-4-29</td>
<td>Mono Aircraft Monosport 2, 2 PCLM, Kinner 90 h.p.</td>
<td>1,053</td>
<td>597</td>
<td>1,650</td>
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<td>10-7-29</td>
<td>Stolarman C-1TR, 3 PO-Camb, (Edeo M Floats) R-760 225 h.p.</td>
<td>1,741</td>
<td>1,013</td>
<td>2,754</td>
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<td>252</td>
<td>10-7-29</td>
<td>Lockheed Vega, 7 PCLM, Wright R-755 300 h.p.</td>
<td>3,700</td>
<td>1,915</td>
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<td>10-9-29</td>
<td>Swallow 2-W, 2 PCLM, Warner 110 h.p.</td>
<td>1,291</td>
<td>538</td>
<td>1,729</td>
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<td>254</td>
<td>10-12-29</td>
<td>Curtiss-Wright Travel Air 4D, 3 PCLM, Wright R-760 240 h.p.</td>
<td>1,387</td>
<td>1,013</td>
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<td>10-12-29</td>
<td>Star Model C, 2 PCLM, LeBlond 65 h.p.</td>
<td>804</td>
<td>529</td>
<td>1,400</td>
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<td>256</td>
<td>11-8-29</td>
<td>Davis D-1, 2 PCLM, LeBlond 5D 65 h.p.</td>
<td>830</td>
<td>495</td>
<td>1,334</td>
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<td>257</td>
<td>10-16-29</td>
<td>Waco CT-0, 3 PCLM, R-760 240 h.p.</td>
<td>1,677</td>
<td>973</td>
<td>2,600</td>
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<td>258</td>
<td>11-20-29</td>
<td>Consolidated &quot;Commodore&quot; Type 7 and Type 225 or 33 PCFbM 2 Hornet &quot;E&quot; @ 375 h.p.</td>
<td>2,940</td>
<td>2,200</td>
<td>5,500</td>
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<td>259</td>
<td>10-19-29</td>
<td>Inland S-300, 2 PCLM, LeBlond 65 h.p.</td>
<td>768</td>
<td>324</td>
<td>1,290</td>
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<td>10-30-29</td>
<td>Patrician, 2 PO-1-2, 3 PO-1, R-78-D, R-65 PCLM, 3 Cyclones @ 525 h.p.</td>
<td>10,224</td>
<td>6,376</td>
<td>16,600</td>
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<td>261</td>
<td>10-24-29</td>
<td>Curtiss-Robertson Thrush J, 6 PCLM, R-760</td>
<td>225 h.p.</td>
<td>2,260</td>
<td>1,540</td>
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<tr>
<td>263</td>
<td>10-28-29</td>
<td>Rand M-1-CK, 2 PCLM, Kinner 90 h.p.</td>
<td>3,053</td>
<td>1,617</td>
<td>4,670</td>
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<td>264</td>
<td>11-14-29</td>
<td>St. Louis Cardinal C-2-90, 2 PCLM, LeBlond 90 h.p.</td>
<td>990</td>
<td>538</td>
<td>1,557</td>
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<td>11-2-29</td>
<td>Paramount Calnain, 4 PCLM, LeBlond 540 h.p.</td>
<td>1,010</td>
<td>620</td>
<td>2,630</td>
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<td>266</td>
<td>11-14-29</td>
<td>Curtis Fledgling J1, 2 PCLM, Wright R-540</td>
<td>165 h.p.</td>
<td>2,000</td>
<td>2,700</td>
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<tr>
<td>267</td>
<td>8-8-29</td>
<td>Verville 104, 4 PCLM, R-760 225 h.p.</td>
<td>2,166</td>
<td>1,244</td>
<td>3,400</td>
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<td>268</td>
<td>11-9-29</td>
<td>Curtiss-Robertson Robin W, 3 PCLM, Warner 110 h.p.</td>
<td>1,520</td>
<td>780</td>
<td>2,300</td>
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<td>269</td>
<td>11-6-29</td>
<td>Curtiss Fledgling J2, 2 PCLM, Wright R-760</td>
<td>225 h.p.</td>
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<td>888</td>
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<td>Curtiss-Robertson Robin 4-C, 4 PCLM, Challenger 170 h.p.</td>
<td>1,076</td>
<td>924</td>
<td>2,600</td>
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<td>271</td>
<td>11-8-29</td>
<td>Bach 4 CT-9, 10 PCLM, 2 Wright R-760's @ 225 h.p.</td>
<td>5,010</td>
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<td>272</td>
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<td>Davis D-1-X, 2 PCLM, Kinner 90 h.p.</td>
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<td>11-13-29</td>
<td>St. Louis Cardinal C-2-2, 4 PCLM, LeBlond 65 h.p.</td>
<td>920</td>
<td>521</td>
<td>1,450</td>
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<td>274</td>
<td>11-14-29</td>
<td>Rogers, RB-X, 4 POPeb, R-760 240 h.p.</td>
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<td>1,034</td>
<td>3,430</td>
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<td>11-13-29</td>
<td>Mono Aircraft Monocouche 275, 4 PCLM, Wright R-760 225 h.p.</td>
<td>1,883</td>
<td>1,217</td>
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<td>11-14-29</td>
<td>Detroit Ryan Speedster P-2-A (formerly Parks P-2-A), 3 PCLM, Wright R-540 165 h.p.</td>
<td>1,483</td>
<td>897</td>
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<tr>
<td>A.T.C. No.</td>
<td>Date Issued</td>
<td>Airplane</td>
<td>Weight Empty</td>
<td>Useful Load</td>
<td>Gross Weight</td>
</tr>
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<td>------------</td>
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<td>12-4-29</td>
<td>St. Louis Cardinal C-210, 2PCLM, Kinzer 90 h.p.</td>
<td>1,006</td>
<td>557</td>
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<td>12-2-29</td>
<td>Curtiss-Wright Travel Air 10-D, 4PCLM, Wright R-760 225 h.p.</td>
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<td>1,270</td>
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<td>Lincoln PT Xliner, 2PCLB, Wright 90 h.p.</td>
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<td>1,767</td>
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<td>Travel Air 4-P, 3PCLM, ACE LA-1 140 h.p.</td>
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<td>827</td>
<td>2,358</td>
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<td>1-13-29</td>
<td>Folker AF-32, 3PCLM, Hornet &quot;B&quot;</td>
<td>3,785</td>
<td>9,340</td>
<td>24,250</td>
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<tr>
<td>282</td>
<td>12-13-29</td>
<td>American Eagle Phaeton R-540, 3PCLM, Wright R-540 165 h.p.</td>
<td>1,759</td>
<td>801</td>
<td>2,560</td>
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<td>12-16-29</td>
<td>American Eagle, Phaeton J5, 3PCLM, Wright J5 220 h.p.</td>
<td>1,896</td>
<td>597</td>
<td>2,803</td>
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<td>12-31-29</td>
<td>Lincoln PT Warner, 2PCLB, Warner 90 h.p.</td>
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<td>597</td>
<td>1,794</td>
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<td>Courier PB-1, 3PCLM, Kinzer 90 h.p.</td>
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<td>713</td>
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<td>Spartan C3-225, 3PCLM, Wright R-760 225 h.p.</td>
<td>1,741</td>
<td>459</td>
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<td>American Aeronautical Savoia Marchetti (American) S-56, 3P0AmB, Kinzer 90 h.p.</td>
<td>1,451</td>
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<td>1-22-30</td>
<td>Detroit Sea Rover, 4PFOBb, Challenger 185 h.p. (See Eng. Memo.)</td>
<td>1,715</td>
<td>980</td>
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<td>Fairchild 71-A, 7PCLM, Wasp 420 h.p.</td>
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<td>1-30-30</td>
<td>Spartan C3-166, 3PCLM, Comet 130 h.p.</td>
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<td>606</td>
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<td>1-3-35</td>
<td>Consolidated Flierster 17, 8PCLM, Hornet B 575 h.p.</td>
<td>3,326</td>
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<td>1-13-30</td>
<td>Stearman A-4-E, 3PCLB, Wasp 420 h.p.</td>
<td>2,426</td>
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<td>293</td>
<td>1-28-30</td>
<td>American Eagle 201, 3PCLM, Kinzer 90 h.p. (See Eng. Memo.)</td>
<td>1,168</td>
<td>782</td>
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<tr>
<td>294</td>
<td>2-1-30</td>
<td>Stinson SM-8B, 4PCLM, Wright R-760 300 h.p.</td>
<td>2,063</td>
<td>1,373</td>
<td>3,436</td>
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<td>2-11-30</td>
<td>Stinson SM-8A, 4PCLSM (Edeo P Floats)</td>
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<td>1,134</td>
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<td>296</td>
<td>2-12-30</td>
<td>Ford 5AT-CS, 15PCLSM, 3 Wasp Junior @ 450 h.p. (Aircraft Products A-2706 Floats)</td>
<td>3,675</td>
<td>4,825</td>
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<td>297</td>
<td>2-15-30</td>
<td>Rand M-1-CW Warner, 2PCLM, Warner 110 h.p.</td>
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<td>1,750</td>
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<td>1-18-30</td>
<td>Stinson SM-7A, 4PCLM, Wright R-875 300 h.p.</td>
<td>2,234</td>
<td>1,265</td>
<td>3,500</td>
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<td>1-12-30</td>
<td>Buck 3-CT-05, 9PCLM, 2 R-760's @ 225 and 1 Wasp 450 h.p.</td>
<td>5,193</td>
<td>2,807</td>
<td>8,000</td>
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<tr>
<td>300</td>
<td>1-14-30</td>
<td>Lockheed Sirius 8 and 8A, 2PCLM, Wasp 420 h.p.</td>
<td>2,078</td>
<td>1,622</td>
<td>4,600</td>
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<tr>
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<td>1-18-30</td>
<td>American Eagle D-430, 4PCLM, R-540 165 h.p.</td>
<td>1,864</td>
<td>1,133</td>
<td>2,997</td>
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<td>302</td>
<td>1-3-30</td>
<td>American Eagle E-430, 4PCLM, Continental A-70 165 h.p.</td>
<td>1,875</td>
<td>1,133</td>
<td>3,008</td>
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<tr>
<td>303</td>
<td>1-24-30</td>
<td>Driggs Skylark Model 1, 2PCLB, Warner 75 h.p.</td>
<td>2,256</td>
<td>1,544</td>
<td>3,800</td>
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<td>1-26-30</td>
<td>Stearman A-4C, 3PCLB, R-875 300 h.p.</td>
<td>2,297</td>
<td>1,593</td>
<td>3,880</td>
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<td>1-4-30</td>
<td>Stearman A-4D, 3PCLB, Wasp Junior 300 h.p.</td>
<td>2,297</td>
<td>1,593</td>
<td>3,880</td>
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<tr>
<td>306</td>
<td>1-2-30</td>
<td>Mono, Monocoupe 90, 2PCLSM (Edeo II Floats)</td>
<td>2,325</td>
<td>1,199</td>
<td>3,524</td>
</tr>
<tr>
<td>307</td>
<td>1-4-30</td>
<td>Waco RNF, 3PCLSB Warner 110 h.p. (Edeo L Floats)</td>
<td>1,750</td>
<td>747</td>
<td>1,877†</td>
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<tr>
<td>308</td>
<td>1-7-30</td>
<td>Folker AF-32, 3PCLM, Hornet &quot;B&quot;</td>
<td>3,785</td>
<td>9,340</td>
<td>24,250</td>
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<tr>
<td>311</td>
<td>1-6-30</td>
<td>Davis-D-1-06, 2PCLM, LeBlond 66 85 h.p.</td>
<td>3,542</td>
<td>826</td>
<td>1,380</td>
</tr>
<tr>
<td>312</td>
<td>4-3-30</td>
<td>Alexander Bullet C-7, 4PCLM, R-540 165 h.p.</td>
<td>1,798</td>
<td>1,082</td>
<td>2,780</td>
</tr>
</tbody>
</table>

† These weights decreased 15 lbs. if wood propeller substituted for steel.
APPENDIX

<table>
<thead>
<tr>
<th>A.T.C. No.</th>
<th>Date Issued</th>
<th>Airplane</th>
<th>Weight Empty</th>
<th>Useable Load</th>
<th>Gross Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>319</td>
<td>4-30</td>
<td>Bellanca Skyrocket (CH-400), 6PCLSM</td>
<td>2,592</td>
<td>2,058</td>
<td>4,650</td>
</tr>
<tr>
<td>320</td>
<td>5-7-30</td>
<td>Consolidated Fleetster 20 Type 2, 6PCLM</td>
<td>3,012</td>
<td>1,688</td>
<td>5,000</td>
</tr>
<tr>
<td>321</td>
<td>5-6-30</td>
<td>Star E. Lammler, 2PCLM, Lambert 1766</td>
<td>3,439</td>
<td>2,261</td>
<td>5,000</td>
</tr>
<tr>
<td>322</td>
<td>5-9-30</td>
<td>Stearman 4-EM, 1POLB, Wasp 1450 h.p.</td>
<td>2,455</td>
<td>1,481</td>
<td>3,036</td>
</tr>
<tr>
<td>323</td>
<td>5-19-30</td>
<td>Verville AT, 2POLB, Continental A-70 163 h.p.</td>
<td>1,562</td>
<td>678</td>
<td>2,240</td>
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<tr>
<td>324</td>
<td>5-27-30</td>
<td>New Standard Model D-29-S, 2POLB, Kinne</td>
<td>1,155</td>
<td>655</td>
<td>1,850</td>
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<tr>
<td>325</td>
<td>5-27-30</td>
<td>Stearman 4-DM, 1POLB, Wasp Jr. 300 h.p.</td>
<td>2,326</td>
<td>1,910</td>
<td>3,936</td>
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<tr>
<td>327</td>
<td>6-16-30</td>
<td>Mono Aircraft Monocoupe 110, 2POLB, Warner 170 h.p.</td>
<td>991</td>
<td>620</td>
<td>1,611</td>
</tr>
<tr>
<td>328</td>
<td>6-19-30</td>
<td>Bellanca Pacemaker 300 W (Edel K) float, 6PCLSM, Wasp Jr. 300 h.p.</td>
<td>2,465</td>
<td>1,835</td>
<td>4,300</td>
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<tr>
<td>329</td>
<td>6-20-30</td>
<td>Stinson SM-1B, 4PCLM, Wasp Jr. 300 h.p.</td>
<td>2,092</td>
<td>1,535</td>
<td>4,757</td>
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<tr>
<td>330</td>
<td>6-24-30</td>
<td>Boeing Model 200 Monomail, 1POLB, Hornet</td>
<td>1,875</td>
<td>1,011</td>
<td>4,350</td>
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<tr>
<td>331</td>
<td>6-25-30</td>
<td>Karchke Model 60, 2PCLM, Lambert 60 h.p.</td>
<td>834</td>
<td>534</td>
<td>1,148</td>
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<tr>
<td>332</td>
<td>6-25-30</td>
<td>Ogden Osprey, 6PCLM, 3 Amer. Cirrus @ 90 h.p.</td>
<td>3,936</td>
<td>2,810</td>
<td>3,036</td>
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<tr>
<td>333</td>
<td>6-27-30</td>
<td>Waco HS0, 3POLB, Packard R-1880 225 h.p.</td>
<td>1,314</td>
<td>786</td>
<td>2,000</td>
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<tr>
<td>335</td>
<td>7-10-30</td>
<td>Stinson SM-600, 1POLC, 3 Lycoming</td>
<td>2,622</td>
<td>2,278</td>
<td>4,900</td>
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<tr>
<td>336</td>
<td>7-11-30</td>
<td>American Aero. S-56-B, 3POAmB, Kinne</td>
<td>1,596</td>
<td>740</td>
<td>1,729</td>
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<tr>
<td>337</td>
<td>7-14-30</td>
<td>Waco OSO, 3POLB, Continental 165 h.p.</td>
<td>1,482</td>
<td>1,875</td>
<td>3,957</td>
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<tr>
<td>338</td>
<td>7-17-30</td>
<td>Detroit E-2A, 3POAmB, Challenger 185 h.p.</td>
<td>1,970</td>
<td>755</td>
<td>2,725</td>
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<tr>
<td>339</td>
<td>7-17-30</td>
<td>Waco P80, 3POLB, A.C.E. LA-1, 140 h.p.</td>
<td>1,598</td>
<td>923</td>
<td>3,441</td>
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<tr>
<td>340</td>
<td>7-22-30</td>
<td>Sparkey Model 39-A, 1PCAmM, Wasp Jr. 300 h.p.</td>
<td>2,055</td>
<td>1,245</td>
<td>3,700</td>
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<tr>
<td>341</td>
<td>7-22-30</td>
<td>Swallow H-A, 3POLB, Axelson 150 h.p.</td>
<td>1,416</td>
<td>784</td>
<td>2,200</td>
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<tr>
<td>342</td>
<td>7-25-30</td>
<td>Inland B-900, 2POLB, Warner V-2 85 h.p.</td>
<td>786</td>
<td>504</td>
<td>1,290</td>
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<tr>
<td>343</td>
<td>7-25-30</td>
<td>Lincoln PTT, 2POLB, Brownback 400 90 h.p.</td>
<td>877</td>
<td>504</td>
<td>1,421</td>
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<tr>
<td>344</td>
<td>8-2-30</td>
<td>Waco 1NP, 3POLB, Kinne R-440 125 h.p.</td>
<td>1,664</td>
<td>598</td>
<td>1,762</td>
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<tr>
<td>345</td>
<td>8-11-30</td>
<td>Ryan C-1, 4PCLM, R-760 240 h.p.</td>
<td>1,717</td>
<td>740</td>
<td>1,911</td>
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<tr>
<td>346</td>
<td>8-13-30</td>
<td>Curtiss-Robertson Kingbird D-1, 8PCLM, R-760's @ 240 h.p.</td>
<td>2,078</td>
<td>1,171</td>
<td>3,353</td>
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<tr>
<td>347</td>
<td>8-16-30</td>
<td>Curtiss-Robertson Kingbird D-2, 8PCLM, R-760's @ 240 h.p.</td>
<td>2,354</td>
<td>1,511</td>
<td>3,865</td>
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<tr>
<td>348</td>
<td>8-16-30</td>
<td>Wright R-975 @ 300 h.p.</td>
<td>3,754</td>
<td>2,838</td>
<td>6,592</td>
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<tr>
<td>349</td>
<td>8-11-30</td>
<td>States B-75, 2POLB, Kinne 100 h.p.</td>
<td>1,083</td>
<td>552</td>
<td>1,635</td>
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<tr>
<td>350</td>
<td>8-11-30</td>
<td>St. Louis C-2-85, 2PCLM, LeBlond 85 h.p.</td>
<td>949</td>
<td>580</td>
<td>1,529</td>
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<tr>
<td>351</td>
<td>8-13-30</td>
<td>Aeronautical Aerona C-2 and Aerona PO-7, 2POLB and 1POSB, (AFC Model A-1080 floats)</td>
<td>308</td>
<td>274</td>
<td>672</td>
</tr>
<tr>
<td>352</td>
<td>8-13-30</td>
<td>Curtiss-Wright Travel Air 62, 6PCLM, R-975 R-760's @ 240 h.p.</td>
<td>2,797</td>
<td>1,713</td>
<td>4,510</td>
</tr>
<tr>
<td>353</td>
<td>8-20-30</td>
<td>Laird LCB-300, 3POLB, R-765 300 h.p.</td>
<td>1,958</td>
<td>1,064</td>
<td>3,022</td>
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<tr>
<td>354</td>
<td>8-20-30</td>
<td>Great Lakes 27-1, 1POLB, Amer. Cirrus</td>
<td>1,012</td>
<td>568</td>
<td>1,580</td>
</tr>
<tr>
<td>355</td>
<td>8-20-30</td>
<td>Mono Aircraft Monocoupe 90J, 2PCLM, Warner Jr. 60 h.p.</td>
<td>902</td>
<td>609</td>
<td>1,511</td>
</tr>
<tr>
<td>356</td>
<td>8-23-30</td>
<td>Sikorsky S-36-BH, 100mph, 1 Hornet B's @ 760 h.p.</td>
<td>6,090</td>
<td>3,580</td>
<td>10,670</td>
</tr>
<tr>
<td>357</td>
<td>8-25-30</td>
<td>Fairchild 51, 5PCSM (4 floats) R-975 300 h.p.</td>
<td>2,702</td>
<td>1,208</td>
<td>4,000</td>
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<tr>
<td>358</td>
<td>8-25-30</td>
<td>Pembroke, Wasp Jr. 300 h.p.</td>
<td>2,449</td>
<td>1,480</td>
<td>3,929</td>
</tr>
<tr>
<td>359</td>
<td>8-25-30</td>
<td>Mono Aircraft Monocoupe 125, 2PCLM, Kinne B5 125 h.p.</td>
<td>1,607</td>
<td>583</td>
<td>1,950</td>
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<tr>
<td>360</td>
<td>8-27-30</td>
<td>Bliford, 12PCLM, geared Conqueror 600 h.p. (Nos. 701 and up)</td>
<td>6,617</td>
<td>4,010</td>
<td>9,627</td>
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<tr>
<td>361</td>
<td>8-30-30</td>
<td>Viking N2, 2POLB, Wasp R-760 240 h.p.</td>
<td>2,300</td>
<td>1,150</td>
<td>3,450</td>
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<tr>
<td>362</td>
<td>9-2-30</td>
<td>Waco CAG, 1POLB, Wasp R-760 240 h.p.</td>
<td>1,359</td>
<td>724</td>
<td>1,963</td>
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<tr>
<td>363</td>
<td>9-10-30</td>
<td>Fairchild KR-31B, 2POLB, Kinne R-440 (B-3)</td>
<td>300 h.p.</td>
<td>1,120</td>
<td>610</td>
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<tr>
<td>364</td>
<td>9-13-30</td>
<td>Piteau PA-8, 1 or 3POLB, Wright R-975 300 h.p.</td>
<td>2,694</td>
<td>1,706</td>
<td>4,400</td>
</tr>
</tbody>
</table>
## Aircraft Year Book

### Aircraft Approved for License Without Approved Type Certificates

<table>
<thead>
<tr>
<th>Memo</th>
<th>Approved Airplane</th>
<th>Gross Weight</th>
<th>Manufacturers Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3</td>
<td>1-14</td>
<td>Cessna 4PCLM, SH-12 128 h.p.</td>
<td>2,260</td>
</tr>
<tr>
<td>2-4</td>
<td>12-28</td>
<td>Stout (Ford) 4-AT-A, 14PCLM, 3 Wright J5's</td>
<td>9,300</td>
</tr>
<tr>
<td>2-5</td>
<td>11-10-27-28</td>
<td>Superseded by A.T.C. No. 87</td>
<td>12,650</td>
</tr>
<tr>
<td>2-6</td>
<td>12-19-26</td>
<td>Superseded by A.T.C. No. 94</td>
<td>7,400</td>
</tr>
<tr>
<td>2-7</td>
<td>12-8-27</td>
<td>Superseded by A.T.C. No. 94</td>
<td>6,000</td>
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<tr>
<td>2-8</td>
<td>12-18-27</td>
<td>Superseded by A.T.C. No. 94</td>
<td>5,600</td>
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<tr>
<td>2-9</td>
<td>14-1-12-18</td>
<td>Superseded by A.T.C. No. 94</td>
<td>4,500</td>
</tr>
<tr>
<td>2-10</td>
<td>14-1-12-18</td>
<td>Superseded by A.T.C. No. 94</td>
<td>3,600</td>
</tr>
<tr>
<td>2-11</td>
<td>14-1-12-18</td>
<td>Superseded by A.T.C. No. 94</td>
<td>2,850</td>
</tr>
<tr>
<td><strong>F Note:</strong> Empty weight includes landing lights, battery, starter, generator, N.A.C.A. cowling and wheel streamlines.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>F Note:</strong> Empty weight does not include starter, generator and battery (Total 46 lbs.).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>F Note:</strong> Empty weight includes Townend Ring and high or low pressure tires.</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
## APPENDIX

<table>
<thead>
<tr>
<th>Memo No.</th>
<th>Date</th>
<th>Airplane</th>
<th>Gross Weight</th>
<th>Manufacturers' Numbers</th>
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<tbody>
<tr>
<td>2-23</td>
<td>6-15-28</td>
<td>Ilyushin UN-4</td>
<td>2,100</td>
<td>All</td>
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<tr>
<td>2-24</td>
<td>10-24-28</td>
<td>Stinson SM-1B, 6PCLM, Wright J5 220 h.p.</td>
<td>2,100</td>
<td>All</td>
</tr>
<tr>
<td>2-25</td>
<td>7-6-28</td>
<td>Travel Air Smith Incubator, 3PCLM, Anzani</td>
<td>2,150</td>
<td>277</td>
</tr>
<tr>
<td>2-26</td>
<td>6-14-28</td>
<td>Travel Air Huf-Land, 3PCLM, OX5 90 h.p.</td>
<td>2,150</td>
<td>501-502</td>
</tr>
<tr>
<td>2-27</td>
<td>2-23-29</td>
<td>Travel Air 5000, 5PCLM, Wright J5 220 h.p.</td>
<td>3,600</td>
<td>Only relicensing</td>
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<tr>
<td>2-28</td>
<td></td>
<td>Superseded by A.T.C. No. 100.</td>
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<tr>
<td>2-29</td>
<td>12-1-28</td>
<td>Thaden T-1, 3PCLM, Wasp 450 h.p.</td>
<td>5,320</td>
<td>All</td>
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<tr>
<td>2-30</td>
<td>11-30-29</td>
<td>Boeing 40B, 4PCL, Hornet 525 h.p.</td>
<td>6,079</td>
<td>882, 1095</td>
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<tr>
<td>2-31</td>
<td></td>
<td>Superseded by A.T.C. No. 103.</td>
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</tr>
<tr>
<td>2-32</td>
<td>2-7-29</td>
<td>Ford 5-AT-A, 12-1PCLM, 3 Wasp @ 420 h.p.</td>
<td>12,150</td>
<td>2 and 3</td>
</tr>
<tr>
<td>2-33</td>
<td>1-12-29</td>
<td>Brunner-Winkle Bird A, 3PCLM, OX5 90 h.p.</td>
<td>2,150</td>
<td>1000-1008</td>
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<tr>
<td>2-34</td>
<td>4-5-29</td>
<td>Fokker FVII, 1OPCLM, Hornet 525 h.p.</td>
<td>7,553</td>
<td>617</td>
</tr>
<tr>
<td>2-35</td>
<td>2-19-29</td>
<td>Travel Air W-4000, 3PCLM, Warner 110 h.p.</td>
<td>2,270</td>
<td>All</td>
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<tr>
<td>2-36</td>
<td>12-17-29</td>
<td>Travel Air 630, 4PCLM, 2,525 h.p.</td>
<td>16,480</td>
<td>14-6</td>
</tr>
<tr>
<td>2-37</td>
<td>2-29</td>
<td>Curtiss Falcon Cargo, 2PCLM, D-12-D 435 h.p.</td>
<td>4,658</td>
<td>5</td>
</tr>
<tr>
<td>2-38</td>
<td>1-19-29</td>
<td>New Standard D-24, 3PCLM, Hisso 150 h.p.</td>
<td>3,400</td>
<td>101, 102, 104</td>
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<tr>
<td>2-40</td>
<td>2-29</td>
<td>Fairchild FC-2C, 5PCLM, Curtiss C-6A 160 h.p.</td>
<td>3,360</td>
<td>280</td>
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<tr>
<td>2-41</td>
<td>8-2-29</td>
<td>Moth (British), 2PCLM, DH Gipsy 85 h.p.</td>
<td>1,650</td>
<td>Two only</td>
</tr>
<tr>
<td>2-42</td>
<td>2-16-29</td>
<td>Travel Air 2000, 3PCLM, OX5 90 h.p. (Edo Flotte)</td>
<td>2,351</td>
<td>179, 181, 555</td>
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<tr>
<td>2-43</td>
<td>2-21-29</td>
<td>Boeing 64 Heavy Training, 2PCLM, Wright J5</td>
<td>2,735</td>
<td>314</td>
</tr>
<tr>
<td>2-44</td>
<td>2-23-29</td>
<td>Kreider-Reisner C-5, 3PCLM, Warner 110 h.p.</td>
<td>1,255</td>
<td>34 and 30</td>
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<tr>
<td>2-45</td>
<td>3-1-29</td>
<td>Beech 1-1PCLM, Hornet 525 h.p.</td>
<td>6,079</td>
<td>5, 2, 4</td>
</tr>
<tr>
<td>2-46</td>
<td>6-28-29</td>
<td>Buhl CA-3, 6PCLB, Wasp 450 h.p.</td>
<td>5,750</td>
<td>12, 40</td>
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<tr>
<td>2-47</td>
<td>3-23-29</td>
<td>Aeromarine-Klemm AKL-25-A, 2PCLM, Salmon ADY 40 h.p.</td>
<td>1,325</td>
<td>103</td>
</tr>
<tr>
<td>2-49</td>
<td>3-22-29</td>
<td>Butler Black Hawk, 3PCLM, Wright J5 220 h.p.</td>
<td>2,859</td>
<td>129</td>
</tr>
<tr>
<td>2-50</td>
<td>3-26-29</td>
<td>Ryan B-3, 5PCLM, K-975 300 h.p.</td>
<td>3,704</td>
<td>117</td>
</tr>
<tr>
<td>2-51</td>
<td>5-2-29</td>
<td>Buhl CA-3 Special, 5PCLB, Wright R-975 309 h.p.</td>
<td>4,050</td>
<td>315, 32, 127</td>
</tr>
<tr>
<td>2-52</td>
<td>3-28-29</td>
<td>Bellanca CH-300, 6PCLM, Wright R-975 309 h.p.</td>
<td>4,050</td>
<td>2-7</td>
</tr>
<tr>
<td>2-53</td>
<td>3-29-29</td>
<td>Stearman C-2-K, 3PCLB, SH-12 128 h.p.</td>
<td>2,400</td>
<td>34-68</td>
</tr>
<tr>
<td>2-54</td>
<td>3-30-29</td>
<td>Stearman C-3-L, 3PCLM, Comet 130 h.p.</td>
<td>2,525</td>
<td>169</td>
</tr>
<tr>
<td>2-55</td>
<td>7-9-29</td>
<td>Curtiss Fledgling, 2PCLM, Challenger 170 h.p. (Convertible military planes permissible gross weight 2,701)</td>
<td></td>
<td>1 and up and Br and up</td>
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<tr>
<td>2-56</td>
<td>4-1-29</td>
<td>Viking (Bourdon) B-2, 3PCLM, SH-14 113 h.p.</td>
<td>1,975</td>
<td>300-307</td>
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<tr>
<td>2-57</td>
<td>6-12-29</td>
<td>International F-17-H, 3PCLM, Hisso 150-180 h.p.</td>
<td>2,706</td>
<td>4-11</td>
</tr>
<tr>
<td>2-58</td>
<td>4-12-29</td>
<td>Stearman C-3-L, 3PCLM, Comet 130 h.p.</td>
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<td>2-59</td>
<td>7-9-29</td>
<td>Curtiss Fledgling, 2PCLM, Challenger 170 h.p. (Convertible military planes permissible gross weight 2,701)</td>
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<td>2-60</td>
<td>11-7-29</td>
<td>Stinson SM-1D-390, 6PCLM, Wright R-975 300 h.p.</td>
<td>4,300</td>
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<td>2-61</td>
<td></td>
<td>Superseded by A.T.C. No. 190.</td>
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<td>1 and up and Br and up</td>
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<td>2-62</td>
<td>7-31-29</td>
<td>Metal Aircraft G-W, Flamingo, 8PCLM, Wasp</td>
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<tr>
<td>2-63</td>
<td>5-14-29</td>
<td>Metal Aircraft G-2, Flamingo, 6PCLM, Wasp</td>
<td>5,718</td>
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<td>2-64</td>
<td>6-10-29</td>
<td>Boeing 40B, 4PCL, Hornet 525 h.p.</td>
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<td>2-65</td>
<td>11-4-29</td>
<td>Moth 60-G, 2PCLB, DH Gipsy 85 h.p. (American)</td>
<td>1,550</td>
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<td>2-66</td>
<td>9-5-29</td>
<td>Lincoln 3A, 3PCLB, Hisso 150-180 h.p.</td>
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<td>247, 250 and up</td>
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<td>2-67</td>
<td>5-13-29</td>
<td>Metal Aircraft G-2-H, 6PCLM, Hornet 525 h.p.</td>
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<td>2-68</td>
<td>5-15-29</td>
<td>Sikorsky S-38-B Special, 11PCLM, 2 Wasp @ 420 h.p.</td>
<td>10,480</td>
<td>114-7-114-8</td>
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<td>Date</td>
<td>Airplane</td>
<td>Gross Weight</td>
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<td>2-69</td>
<td>5-16-29</td>
<td>Sikorsky S-38-B Special, 4PCAmB, 2 Wasps</td>
<td>450 h.p.</td>
<td>11-49</td>
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<tr>
<td>2-70</td>
<td>5-22-29</td>
<td>Stearman C-3-K, 3POLB, SU-14 123 h.p.</td>
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<td>2-71</td>
<td>5-31-29</td>
<td>Curtiss Falcon, 2POLB, Conqueror 600 h.p.</td>
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<td>2-72</td>
<td>7-24-29</td>
<td>Buhl CA-3D Special, 4PClb, Wright R-975</td>
<td>300 h.p.</td>
<td>45 and up</td>
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<td>2-73</td>
<td>8-31-29</td>
<td>Stimson SM-30A, 4PCLM, Wright R-540 165 h.p.</td>
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<td>1046-1053</td>
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<td>9-4-29</td>
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<td>2-75</td>
<td>9-12-29</td>
<td>Metal Aircraft 62-H, 8PCLM, Hornet 525 h.p.</td>
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<td>2-76</td>
<td>11-29-29</td>
<td>Travel Air A-6000-A, 7PCLM, Wasp 450 h.p.</td>
<td>3,500</td>
<td>849, 802, 966.1078, 2093, 891.1084, 1097, 1098</td>
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<td>2-77</td>
<td>9-14-29</td>
<td>Spartan C-3A, 3POLB, Challenger 170 h.p.</td>
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<td>2-78</td>
<td>9-14-29</td>
<td>Spartan C-3A, 3POLB, Axelson 115 h.p.</td>
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<td>2-79</td>
<td>9-14-29</td>
<td>Spdh. 1 LeBlond 90, 90 h.p.</td>
<td>2,587</td>
<td>101 and up</td>
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<td>2-80</td>
<td>11-8-29</td>
<td>Ford 6-ATS (Special), 12PCSM, 3 Wright R-975s @ 300 h.p. (Brewer Floats)</td>
<td>12,500</td>
<td>6-ATS-1</td>
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<tr>
<td>2-81</td>
<td>9-18-29</td>
<td>Kari Coupe, 6PCLM, Vega 35 h.p.</td>
<td>1,400</td>
<td>210 and up</td>
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<td>2-82</td>
<td>Superseded by A.T.C. No. 107.</td>
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<td>2-83</td>
<td>9-21-29</td>
<td>Boeing 300 Special, 2POLB, Wasp 430 h.p.</td>
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<td>Curtiss-Wright Travel Air D-1066, 3POLB, Wright J5 220 h.p.</td>
<td>2,650</td>
<td>660 h.p. and up. (See Engineering memo.)</td>
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<td>2-85</td>
<td>9-24-29</td>
<td>Keystone K-78, 20 PCPLM, 3 Cyclones @ 125 h.p.</td>
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<tr>
<td>2-86</td>
<td>9-28-29</td>
<td>Fairchild Model 51, 5PCLM, Wright R-975</td>
<td>4,000</td>
<td>2 and up</td>
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<td>2-87</td>
<td>9-12-29</td>
<td>Curtiss Model 75, 2 LeBlond 60's @ 125 h.p.</td>
<td>4,445</td>
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<td>2-89</td>
<td>9-2-29</td>
<td>American Aeronautical Savoia Marchetti S-56, 2POAmB, Kinney 90 h.p.</td>
<td>1,870</td>
<td>50603</td>
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<td>2-90</td>
<td>9-23-29</td>
<td>Ford, 6-AT, 10PCLM, 3A-975's @ 300 h.p.</td>
<td>12,176</td>
<td>4 and up</td>
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<tr>
<td>2-91</td>
<td>7-27-29</td>
<td>Bach 3-CT-S, 10PCLM, 2 Comets @ 130 h.p.</td>
<td>8,000</td>
<td>2000-2001</td>
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<tr>
<td>2-92</td>
<td>Superseded by A.T.C. No. 206.</td>
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<td>2-93</td>
<td>10-27-29</td>
<td>International F-17, 3POLB, OX5 90 h.p.</td>
<td>3,538</td>
<td>6004, 6005, 6006, 6013, 6014, 6015, 6026, 6017, 6021, 6025-6035 inc.</td>
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<td>2-94</td>
<td>9-28-29</td>
<td>Waco 220, 3POLB, Wright J5 220 h.p.</td>
<td>2,310</td>
<td>108 and A-116</td>
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<td>2-95</td>
<td>9-30-29</td>
<td>Waco 20, 3POSB, Wright J5 220 h.p. (Eo DeLuxe Floats)</td>
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<td>818 and A-116</td>
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<tr>
<td>2-96</td>
<td>9-27-29</td>
<td>Alexander A-14, 3PCLM, Wright R-540 165 h.p.</td>
<td>2,588</td>
<td>849 and up</td>
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<tr>
<td>2-97</td>
<td>9-18-30</td>
<td>Bach 3-CT-S, 5PCLM, Wright J5's @ 220 h.p.</td>
<td>8,000</td>
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<td>Mahoney-Ryan B-3A, 6PCLM, Wright J5 220 h.p.</td>
<td>3,700</td>
<td>210 and up</td>
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<td>2-99</td>
<td>8-9-29</td>
<td>Rearwin 2000-C, 3POLB, Challenger 170 h.p.</td>
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<td>101 and up</td>
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<td>2-100</td>
<td>8-12-29</td>
<td>Golden Eagle Chief, 6PCLM, LeBlond 90 90 h.p.</td>
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<td>893 and up</td>
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<td>2-101</td>
<td>8-15-29</td>
<td>Atlantic Coast T-5-L, T4PCGB, 2 Liberty's @ 400 h.p.</td>
<td>13,600</td>
<td>1-5</td>
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<td>2-102</td>
<td>8-16-29</td>
<td>Mono Aircraft Monocoach, 4PCLM, Wright J5 220 h.p.</td>
<td>3,092</td>
<td>5002-5007</td>
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<td>2-103</td>
<td>8-19-29</td>
<td>Arrow Sport, 2POLB, Kinney 90 h.p.</td>
<td>1,520</td>
<td>412 and up</td>
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<td>2-104</td>
<td>8-22-29</td>
<td>Curtiss-Kleemann AKL-26 Special, 2POSM, LeBlond 60 65 h.p.</td>
<td>1,590</td>
<td>2-32 and up</td>
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<td>Fleet Model 3, 2POLB, Wright R-540 165 h.p.</td>
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<td>2-106</td>
<td>8-23-29</td>
<td>Schrecker 17-HT-4, 4POPB, Hesse 180 h.p.</td>
<td>3,321</td>
<td>133 and 162, etc. (See Eng. memo.)</td>
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<td>2-107</td>
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<td>Taylor Chummy B-2, 2POLB, Kinney 90 h.p.</td>
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<td>2-108</td>
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<td>Moth 60GM—Superseded by A.T.C. No. 197.</td>
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<td>9-4-29</td>
<td>Keystone Leoning CcC, 9PCAmN, Cyclone 525 h.p.</td>
<td>6,135</td>
<td>216, 232, 244</td>
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## APPENDIX

<table>
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<tr>
<th>Memo No.</th>
<th>Date Approved</th>
<th>Airplane</th>
<th>Gross Weight</th>
<th>Manufacturers' Numbers</th>
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<td>2-117</td>
<td>9-6-29</td>
<td>Command-Aire 50-3C, 3POLB, Wright R-540</td>
<td>165 h.p.</td>
<td>2-490 W-92</td>
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<td>2-118</td>
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<td>Aviaco Liore et Olivier Le'O 180, 2PCFBm,</td>
<td>165</td>
<td>2 and 3 101-143</td>
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<td>2-119</td>
<td>9-6-29</td>
<td>Salimson 900 180 h.p.</td>
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<td>2-120</td>
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<td>Davis V-1, 2POLM, LeBlond 65 h.p.</td>
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<td>Mono Aircraft Monocoupe 113 Special, 2POLM,</td>
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<td>2-122</td>
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<td>American Eagle—Superseded by A.T.C. No. 283, 3POLM,</td>
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<td>2-123</td>
<td>9-7-29</td>
<td>Curtiss Kingbird J (formerly Kingbird C), 6POLM, 2 R-760's at 240 h.p.</td>
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<td>2-124</td>
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<td>Hamilton H-177, 7PCSM, Hornet 525 h.p.</td>
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<td>58</td>
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<td>2-126</td>
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<td>Stearman C-1B, 3POSB, J5 220 h.p. (Edo P floats)</td>
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<td>2-128</td>
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<td>Mono Aircraft Monoprop, 2POLM, Vello</td>
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<td>Albatross-29, 2POLB,</td>
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<td>2-131</td>
<td>9-25-29</td>
<td>Courier P-1, 3POLM, Kinner 60 h.p.</td>
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<td>Curtiss- Robertson Robin, Hisso, 3PCLM,</td>
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<td>10-4-30</td>
<td>Buil-CA-6W, 4PCMB, Wasp 350 h.p.</td>
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<td>Mono Aircraft Monosport 1, 2POLM, Warner 110 h.p.</td>
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<td>Mono Aircraft Monosport, 2POLM, Kinner</td>
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<td>Stinson SM-2, 3POLM, Kinner 99 h.p.</td>
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<td>Command-Aire 5C-3A, 3POSB, Warner 86 h.p. (Edo DeLuxe Floats)</td>
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<td>Curtiss Wright Travel Air S-6000B, 7PCMM,</td>
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<td>2-139</td>
<td>10-9-29</td>
<td>Cancelled (Planes converted to Model 26C on A.T.C. No. 211)</td>
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<td>Curtiss Wright Travel Air S-6000B, 7PCLM,</td>
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<td>2-142</td>
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<td>Curtiss Wright Travel Air S-6000B, 7PCLM,</td>
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<td>Stinson SM-4C-1, 4PCSL, Wright R-775 225 h.p.</td>
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<td>Monarch A, 3POLB, OX5 90 h.p.</td>
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<td>Coffman A, 3POLC, OX5 90 h.p.</td>
<td>2,732</td>
<td>3 and 100-110</td>
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<td>2-146</td>
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<td>Mono Aircraft Monoprop, 2POLM, Genet 80 h.p.</td>
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<td>11-2-29</td>
<td>Boeing 81-1, 2POLB, Axelton 115 h.p.</td>
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<td>Coupe D-1, 2POLB, Kinner 90 h.p.</td>
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<td>Moth (British) 60-30, 2PCMB, Cirrus Mark II</td>
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<td>Aircraft Industries Steira BL-2, 2PCLM, Comet 130 h.p.</td>
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<td>2-152</td>
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<td>Fleet 5, 2POLB, Brownback C-300 60 h.p.</td>
<td>1,620</td>
<td>2006 and 2007</td>
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<td>2-153</td>
<td>12-14-29</td>
<td>Travel Air 6000B Special, 2PCMB, Wright R-975 300 h.p.</td>
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<td>Travel Air SBC-4000, 3POSB, Challenger 170 h.p. (Edo P Floats)</td>
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<td>4007</td>
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<td>2-156</td>
<td>12-26-29</td>
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<td>2-157</td>
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<td>Nichols Beasly NB3, 2POLM, LeBlond 65 h.p.</td>
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<td>Bollo LW-2, 2POLM, Kinner 99 h.p.</td>
<td>1,252</td>
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<td>2-159</td>
<td>12-4-29</td>
<td>Stearman C-3-B Special, 3POLB, Wright J5 220 h.p.</td>
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<td>2-160</td>
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<td>Travel Air 4-P, 3POLB, Aircraft IA-1 AGB</td>
<td>140 h.p.</td>
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<td>2-161</td>
<td>12-5-29</td>
<td>Bird Wing Imperial No. 10, 3POLB, Wright R-540 165 h.p.</td>
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<td>2-162</td>
<td>12-5-29</td>
<td>Cancelled</td>
<td>2,270</td>
<td>100 and up</td>
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<td>2-163</td>
<td>12-6-29</td>
<td>Folkers F-X-LA, 6PCMA, Cyclone 525 h.p.</td>
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<td>Paramount Cabinaire 110, 4PCLB, Warner 110 h.p.</td>
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<td>2-165</td>
<td>12-16-29</td>
<td>Paramount Cabinaire 110, 3PCLB, Warner 110 h.p.</td>
<td>2,252</td>
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<td>2-166</td>
<td>12-16-29</td>
<td>American Eagle Phaeton Hisso, 3POLM, Hisso 180 h.p.</td>
<td>2,849</td>
<td>600 and up</td>
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<tr>
<td>Memo No.</td>
<td>Approved Date</td>
<td>Airplane</td>
<td>Gross Weight</td>
<td>Manufacturers' Numbers</td>
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<tr>
<td>2-167</td>
<td>1-3-30</td>
<td>Travel Air 6000-B, 6PCLM, Wright R-975</td>
<td>300 h.p.</td>
<td>2025</td>
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<tr>
<td>2-168</td>
<td>1-4-30</td>
<td>Viking (Schreck) 17 HMT2, 1POFb, Hisso 150 h.p.</td>
<td>4,230</td>
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<tr>
<td>2-169</td>
<td>1-7-30</td>
<td>Travel Air 4D Special, 3POLB, Wright R-769</td>
<td>235 h.p.</td>
<td>1160</td>
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<td>2-170</td>
<td>1-7-30</td>
<td>Sikorsky R-975, 1PCLM, 2 HorNETs @ 550 h.p.</td>
<td>2,880</td>
<td>2-6</td>
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<tr>
<td>2-171</td>
<td>2-3-30</td>
<td>Emco B-2, 4PCLM, 3 Challenger @ 170 h.p.</td>
<td>7,233</td>
<td>904</td>
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<tr>
<td>2-172</td>
<td>1-9-30</td>
<td>Foker F-XI AHS Special, 8PCAm, Hornet B 575 h.p.</td>
<td>7,100</td>
<td>52</td>
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<tr>
<td>2-173</td>
<td>1-11-30</td>
<td>Miami MM-201, 4PFCFBM, Wright R-975 369 h.p.</td>
<td>3,750</td>
<td>3,485</td>
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<tr>
<td>2-174</td>
<td>1-16-30</td>
<td>Stinson SMb Special, 6PCLM, Wright J52 220 h.p.</td>
<td>1,340, 1372, 1374, 1376</td>
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<tr>
<td>2-175</td>
<td>1-17-30</td>
<td>Bach 3-CT-9 Special, 7PCLM, 2 Wright R-760a</td>
<td>@ 225 h.p. and 1 Wasp 450 h.p.</td>
<td>19</td>
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<tr>
<td>2-176</td>
<td>1-31-30</td>
<td>Whittelsey Avian Mark IV-M, 2POLB, ADB</td>
<td>8,000</td>
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<tr>
<td>2-177</td>
<td>2-5-30</td>
<td>Stearman 4CM Mailplane, 1PCLM, Wright R-760 300 h.p.</td>
<td>3,800</td>
<td>4012</td>
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<td>2-178</td>
<td>2-5-30</td>
<td>Curtiss Wright Travel Air D-1-D, 3POLB, Wright R-760 240 h.p.</td>
<td>2,650</td>
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<tr>
<td>2-179</td>
<td>2-10-30</td>
<td>Superseded by A.T.C. No. 290.</td>
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<td>2-180</td>
<td>2-12-30</td>
<td>Superseded by A.T.C. No. 353.</td>
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<tr>
<td>2-182</td>
<td>2-21-30</td>
<td>Watkins Skylark SL, 2POLM, LeBlond 65 h.p.</td>
<td>1,477</td>
<td>101 and up</td>
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<tr>
<td>2-183</td>
<td>2-26-30</td>
<td>Bellanca CH-300 Pacemaker Special, 6PCLM, Wright R-975 300 h.p.</td>
<td>182</td>
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<tr>
<td>2-184</td>
<td>2-27-30</td>
<td>Swallow R-760 225, 3POLB, Wright R-760 225 h.p.</td>
<td>2,700</td>
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<td>2-185</td>
<td>3-4-30</td>
<td>Kestorex Hornet, 2PCAB, Hornet 555 h.p.</td>
<td>6,135</td>
<td>243, 244, 245</td>
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<td>2-186</td>
<td>3-4-30</td>
<td>St. Louis C-110C, 2PCLM, Wr-975 300 h.p.</td>
<td>1,575</td>
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<tr>
<td>2-187</td>
<td>3-6-30</td>
<td>Laird LCB-300, 3POLB, R-760 300 h.p.</td>
<td>2,922</td>
<td>176, 184, 186</td>
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<td>2-188</td>
<td>3-7-30</td>
<td>Sikorsky—Superseded by A.T.C. 356.</td>
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<tr>
<td>2-189</td>
<td>3-13-30</td>
<td>Robin C-1, 3PCLM, Challenger 185 (Goodyear Airwheels and rigid landing gear struts)</td>
<td>2,600</td>
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<td>2-190</td>
<td>3-18-30</td>
<td>Granville Gee Bee A, 2POLB, Kinner K5 100 h.p.</td>
<td>1,020</td>
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<td>2-191</td>
<td>3-24-30</td>
<td>Davis D-1-L, 2POLM, Lambert 60 h.p.</td>
<td>1,377</td>
<td>301</td>
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<tr>
<td>2-192</td>
<td>3-26-30</td>
<td>Bellanca Skyrocket (Special), 5POLC, Warmer 300 h.p.</td>
<td>3,300</td>
<td>601</td>
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<tr>
<td>2-193</td>
<td>3-26-30</td>
<td>Ogden Osprey, 6PCLM, 3 Amer. Cirrus @ 90 h.p.</td>
<td>5,000</td>
<td>102, 103</td>
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<tr>
<td>2-194</td>
<td>4-3-30</td>
<td>Curtiss 4C-1, 3POLM, Challenger 170 h.p.</td>
<td>2,600</td>
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<tr>
<td>2-195</td>
<td>4-3-30</td>
<td>Ireland N-2-B, 3POLB, R-975 300 h.p.</td>
<td>4,255</td>
<td>32</td>
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<tr>
<td>2-196</td>
<td>4-5-30</td>
<td>Foker FXL-AHS, 2PCAm, HorNETs 375 h.p.</td>
<td>7,200</td>
<td>906</td>
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<tr>
<td>2-197</td>
<td>4-7-30</td>
<td>Command-Aire 3-3-3, 3POLB, OX5 90 h.p.</td>
<td>2,118</td>
<td>646-656 inc.</td>
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<tr>
<td>2-198</td>
<td>4-7-30</td>
<td>Curtiss C-15A, 2POLM, Challenger 185 h.p.</td>
<td>2,212</td>
<td>103</td>
</tr>
<tr>
<td>2-199</td>
<td>4-9-30</td>
<td>Fairchild 42, 3PCLM, Wright R-975 300 h.p.</td>
<td>4,300</td>
<td>W-138</td>
</tr>
<tr>
<td>2-200</td>
<td>4-13-30</td>
<td>Command Air B-37A, 4POLB, Winter 110 h.p.</td>
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<tr>
<td>2-201</td>
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<td>Bellanca Skyrocket (Special), 5POLM, Warmer 450 h.p.</td>
<td>1,400</td>
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<tr>
<td>2-202</td>
<td>5-1-30</td>
<td>American Aeronautical Savoia Marchetti S-55, P, 15PCFBM, 2 T. P. Assoc's @ 500 h.p.</td>
<td>16,100</td>
<td>10514, 10517</td>
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<tr>
<td>2-203</td>
<td>5-1-30</td>
<td>Air Associates Avio Avian (Special), 280, 300, Wright Gipsy 90 h.p.</td>
<td>1,450</td>
<td>136</td>
</tr>
<tr>
<td>2-204</td>
<td>5-9-30</td>
<td>Curtiss-Robertson Thrush J (Special), 6PCLM, Wright R-760 240 h.p.</td>
<td>3,800</td>
<td>1095</td>
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<tr>
<td>2-205</td>
<td>5-9-30</td>
<td>Hockinson T&amp;T-7, 3PCLB, 3 Challengers @ 185 h.p.</td>
<td>6,783</td>
<td>101</td>
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<tr>
<td>2-206</td>
<td>5-10-30</td>
<td>Zenith Z-4-A, 7PCLB, Warmer 450 h.p.</td>
<td>4,394</td>
<td>3</td>
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<tr>
<td>2-207</td>
<td>5-10-30</td>
<td>Bellanca Skyrocket CH-400 (Special), 6PCLM, Warmer 450 h.p.</td>
<td>4,394</td>
<td>11-4 inc.</td>
</tr>
<tr>
<td>2-208</td>
<td>5-10-30</td>
<td>Boeing B-2E, 5PFCFBM, Warmer 450 h.p.</td>
<td>4,500</td>
<td>1074</td>
</tr>
<tr>
<td>2-209</td>
<td>5-19-30</td>
<td>Superseded by A.T.C. No. 351.</td>
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# APPENDIX

<table>
<thead>
<tr>
<th>Memo No.</th>
<th>Date</th>
<th>Airplane</th>
<th>Gross Weight</th>
<th>Manufacturers’ Numbers</th>
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<tbody>
<tr>
<td>2-218</td>
<td>6-5-39</td>
<td>Atlantic PW-1, 8PCLM, 3 R-750’s @ 120 h.p.</td>
<td>7,345</td>
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<td>2-219</td>
<td>6-6-39</td>
<td>Consolidated Fleetmaster Type 2 (Special), 6PCLM. Hornet A 525 h.p.</td>
<td>5,000</td>
<td>3</td>
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<tr>
<td>2-220</td>
<td>6-13-30</td>
<td>Ryan B-6, 6PCLM, Wasp Jr. 300 h.p.</td>
<td>4,000</td>
<td>200</td>
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<tr>
<td>2-221</td>
<td>6-14-30</td>
<td>Cessna DC-6-B, 6PCLM. Wasp Jr. 300 h.p.</td>
<td>Passenger plane weights</td>
<td>3,100</td>
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<tr>
<td>2-222</td>
<td>6-13-30</td>
<td>Curtiss Wright Travel Air D-4000, 3POLB, J5</td>
<td>2,650</td>
<td>1391</td>
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<tr>
<td>2-223</td>
<td>6-13-30</td>
<td>Ryan B-7, 6PCLM, Wasp 450 h.p.</td>
<td>4,300</td>
<td>255</td>
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<tr>
<td>2-224</td>
<td>6-13-30</td>
<td>Stinson SM1B Special, 5PCLM, Wright J5</td>
<td>4,000</td>
<td>M-212</td>
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<tr>
<td>2-225</td>
<td>6-13-30</td>
<td>Bull CA-6B, 6PCLM, Wasp 450 h.p.</td>
<td>4,000</td>
<td>61, 62, 63</td>
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<tr>
<td>2-226</td>
<td>6-16-30</td>
<td>Bellanca CH-400, 5PCLM, Wasp 450 h.p.</td>
<td>4,500</td>
<td>605</td>
</tr>
<tr>
<td>2-227</td>
<td>6-17-30</td>
<td>Viking Kitty-Hawk B-1, 3POLB, Kinner K5</td>
<td>1,088</td>
<td>12</td>
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<td>2-228</td>
<td>6-20-30</td>
<td>Stinson SM-IDX, 5PCLM, Packard Diesel</td>
<td>2,915</td>
<td>303</td>
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<tr>
<td>2-229</td>
<td>6-23-30</td>
<td>Soul Model 1000, 4PCLM, 2 LeBlanc 165 h.p.</td>
<td>3,240</td>
<td>1001</td>
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<tr>
<td>2-230</td>
<td>6-26-30</td>
<td>Pitcairn PA-1K, 3POLB, Kinner K5 100 h.p.</td>
<td>1,920</td>
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<td>2-231</td>
<td>7-2-30</td>
<td>Consolidated Fleetmaster 20 Type 1, 1PCLM or 4PCLM, Hornet B 575 h.p.</td>
<td>5,000</td>
<td>1 and 2</td>
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<td>2-232</td>
<td>7-3-30</td>
<td>General rote F, Arisocrat, 1PCLM, Cont. A-70</td>
<td>165 h.p.</td>
<td>22, 27, 28, 29 and 30</td>
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<tr>
<td>2-233</td>
<td>7-9-30</td>
<td>Paramount Cabinaire A20, 4PCLB, Cont. A-70</td>
<td>2,600</td>
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<td>2-234</td>
<td>7-9-30</td>
<td>Travel Air 6000-b Special, 6PCLM, R-975 300 h.p.</td>
<td>4,230</td>
<td>6-B-2012</td>
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<tr>
<td>2-235</td>
<td>7-12-30</td>
<td>Canned by Approved Type Cert. 131.</td>
<td>3,240</td>
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<td>2-236</td>
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<td>Breese R-6, 1PCLM, R-975 300 h.p.</td>
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<td>2-237</td>
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<td>Cessna AF Special, 3PCLM, Axelson 115 h.p.</td>
<td>2,120</td>
<td>141</td>
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<td>2-238</td>
<td>7-22-30</td>
<td>Bellanca Pacemaker CH-200, 6PCLM, Packard DR-980 225 h.p.</td>
<td>4,242</td>
<td>185</td>
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<td>2-239</td>
<td>7-25-30</td>
<td>Timm Collegiate Panther, 2POLM, Panther</td>
<td>1,590</td>
<td>M-105</td>
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<td>2-240</td>
<td>7-26-30</td>
<td>Ford 3-ATC Special, 15PCLM, 3 Wasps @ 420 h.p.</td>
<td>2,399</td>
<td>3</td>
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<tr>
<td>2-241</td>
<td>7-26-30</td>
<td>If wheel fairings and radio installed.</td>
<td>2,500</td>
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<tr>
<td>2-242</td>
<td>7-26-30</td>
<td>Canned by A.T.C. No. 359.</td>
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<tr>
<td>2-243</td>
<td>7-26-30</td>
<td>Ford 3-ATC Special, 15PCLM, 3 Wasps @ 420 h.p.</td>
<td>13,245</td>
<td>3</td>
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<tr>
<td>2-244</td>
<td>7-26-30</td>
<td>Travel Air 4010-1000, 1POLB, J4 200 h.p.</td>
<td>2,541</td>
<td>70</td>
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<td>2-245</td>
<td>7-29-30</td>
<td>Fairchild Model 71, 7PCLM, Wasp 420 h.p.</td>
<td>5,500</td>
<td>1339</td>
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<tr>
<td>2-246</td>
<td>7-30-30</td>
<td>Waco 150-DSO, 3PCLM-SB, Hisso 150 h.p.</td>
<td>4,204</td>
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<tr>
<td>2-247</td>
<td>7-30-30</td>
<td>Deluxe Floats.</td>
<td>2,404</td>
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<tr>
<td>2-248</td>
<td>8-4-30</td>
<td>Franklin Model A, 2POLB, Velle 65 h.p.</td>
<td>3,060</td>
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<td>2-249</td>
<td>8-6-30</td>
<td>Pittsburgh Thaden T-1, 4PCLM, R-975 300 h.p.</td>
<td>2,120</td>
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<tr>
<td>2-250</td>
<td>8-8-30</td>
<td>Boeing 80-B, 16PCLB, 3 Hornet B’s @ 755 h.p.</td>
<td>17,500</td>
<td>1062</td>
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<td>2-251</td>
<td>8-9-30</td>
<td>Command-Aire 5-C-A, 3POLB, Axelson 115 h.p.</td>
<td>2,510</td>
<td>W-142</td>
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<td>2-252</td>
<td>8-12-30</td>
<td>Command-Aire 5-C-A, 3POLB, Challenger 185 h.p.</td>
<td>2,410</td>
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<td>2-253</td>
<td>8-13-30</td>
<td>Solar MS-1, 3PCLM, Wasp 420 h.p.</td>
<td>5,390</td>
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<td>2-254</td>
<td>8-13-30</td>
<td>Fleet X Special, 2POLB, Kinner K5 100 h.p.</td>
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<td>2-255</td>
<td>8-13-30</td>
<td>States B-2, 2POLM, Michigan Aero Rover, 75 h.p.</td>
<td>1,558</td>
<td>102 if baggage compartment sealed; 101 if changed to conform</td>
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<tr>
<td>2-256</td>
<td>8-13-30</td>
<td>Waco RNF, 2POLB, Warner 110 h.p.</td>
<td>1,090</td>
<td>3316</td>
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<tr>
<td>2-257</td>
<td>8-13-30</td>
<td>Lockheed Vega Special, 5PCLM (APC floats) No A-7500</td>
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<tr>
<td>2-258</td>
<td>8-14-30</td>
<td>Aircraft Builders Student Prince Xo, 2POLB, Amer. Cirrus 900 h.p.</td>
<td>1,500</td>
<td>102</td>
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<tr>
<td>2-259</td>
<td>8-14-30</td>
<td>Fairchild 51, 5PCLSM, R-975 300 h.p. (P-4 Floats)</td>
<td>4,000</td>
<td>101 and up</td>
</tr>
<tr>
<td>2-260</td>
<td>8-15-30</td>
<td>Nicholas Beasley NB-4L, 3POLM, Lambert</td>
<td>2,300</td>
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<tr>
<td>2-261</td>
<td>8-15-30</td>
<td>R-266 60 h.p.</td>
<td>1,511</td>
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<td>Superseded by A.T.C. No. 354.</td>
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*Note: Numbers in parentheses indicate the number of the engine.*
<table>
<thead>
<tr>
<th>Memo No.</th>
<th>Date</th>
<th>Airplane Description</th>
<th>Gross Weight</th>
<th>Manufacturers’ Numbers</th>
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<tbody>
<tr>
<td>2-262</td>
<td>8-20-30</td>
<td>Waso BSO, 3POLM, R-540 165 h.p. (Edo M Floats)</td>
<td>2738</td>
<td>3002</td>
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<tr>
<td>2-263</td>
<td>8-20-30</td>
<td>Detroit Ryan Peerless C-2, 4POLM, Packard Diesel R-980 225 h.p.</td>
<td>3450</td>
<td>4014 and up</td>
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<tr>
<td>2-264</td>
<td>8-27-30</td>
<td>Nicholas Beasley NB-4-W, 3POLM, Warner Jr.</td>
<td>1543</td>
<td>105 and up</td>
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<tr>
<td>2-265</td>
<td>9-2-30</td>
<td>Timm TC-165, 2POLM, Continental A-70 165 h.p.</td>
<td>2230</td>
<td>101 and up</td>
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<tr>
<td>2-266</td>
<td>9-5-30</td>
<td>Mentor, 1, 4POLM, Kinser R5 100 h.p.</td>
<td>2290</td>
<td>11 and up</td>
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<tr>
<td>2-267</td>
<td>9-6-30</td>
<td>Stinson SM-2AB, 4PCSM, Wright J5 220 h.p.</td>
<td>3450</td>
<td>1002</td>
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<td>2-268</td>
<td>9-8-30</td>
<td>Boeing H-22, 6PCSM, Wasp 420 h.p.</td>
<td>5725</td>
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<td>2-269</td>
<td>9-13-30</td>
<td>Zenith Z-6-A, 7PCLE, Wasp 420 h.p.</td>
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<td>3 and up</td>
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<td>2-270</td>
<td>9-17-30</td>
<td>Inland S-300-DF, 2POLM, LeBlond ZDF 55 h.p.</td>
<td>1314</td>
<td>8-316-DF</td>
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<td>2-271</td>
<td>9-18-30</td>
<td>California Cub D-1, 2POLM, Lambert R-260</td>
<td>99 h.p.</td>
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<td>2-272</td>
<td>9-24-30</td>
<td>New Fire Star KB-29-S, 2POLM, 100 h.p.</td>
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<td>1020</td>
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<td>2-273</td>
<td>9-25-30</td>
<td>Consolidated Fleetster 17 Type 2-C, 7PCLE, Cycler R-182CE 755 h.p.</td>
<td>5600</td>
<td>1250</td>
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<td>9-29-30</td>
<td>Lockheed Vega Model 5B, 3POLM, Wasp 420 h.p.</td>
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<td>9-30-30</td>
<td>Sikorsky S-30, 8PCSB, 2 J-5’s @ 220 h.p.</td>
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<td>New Standard D-31, 2POLB, Kinser B5 125 h.p.</td>
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<td>American Aeronautical S-35, 11PCFLM, 2 I. F.</td>
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<td>2-278</td>
<td>10-6-30</td>
<td>Stearman KN-1, Special, 3POLM, Wasp 420 h.p.</td>
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<td>4021 and 4022</td>
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<td>2-279</td>
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<td>Stearman KN-1, 2POLB, Wasp Supercharged 450 h.p.</td>
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<td>Nicholas Beazley NB-4G, 3POLM, Genet Mark II 80 h.p.</td>
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<td>103 and up</td>
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<td>Driggs Skylark 3-95, 2POLB, Cirrus Hi-Drive</td>
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<td>Ford 5-AT-A, 13PCLEM 3 Wasp’s @ 420 h.p.</td>
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<td>General Western Bantam P-2, 2POLM, Kinser KS 100 h.p.</td>
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<td>Sikorsky S-41, 13PCAMM, 2 Hornet B’s @ 573 h.p.</td>
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<td>10-16-30</td>
<td>Curtiss Falcon Mailplane, 1POLB, Cyclone</td>
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<td>Fokker A-FX-A DeLuxe, 16PCLM, 3 Wasp’s @ 420 h.p.</td>
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<td>Overland Sport Trainer, 2POLB, LeBlond 5DE 70 h.p.</td>
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<td>Fairchild 7-1A, 3POLM, Wasp 420 h.p.</td>
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<td>10-21-30</td>
<td>Teves T-1, 3PCAmM, 2 Packard Diesel 2R-980’s @ 225 h.p.</td>
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<td>10-22-30</td>
<td>Fairchild KR-34-C, 1POLB, Wright R-970 165 h.p.</td>
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<td>Bellanca Skyrocket Special CH-300, 4POLM, Wasp 420 h.p.</td>
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<td>950 300 h.p.</td>
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<td>Ogden Osprey Pirate, 6PCLM, 3 Menasco Pirate B’s @ 95 h.p.</td>
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<td>10-31-30</td>
<td>Curtiss-Wright Travel Air S600B, 5PCLM, Wright R-975 300 h.p.</td>
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<td>68-2036</td>
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<tr>
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<td>11-5-30</td>
<td>Bellanca CH-300 Special, 6PCLM, Wright R-975 300 h.p.</td>
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<td>Keystone C-3-C Air Yacht, 6PCAMM, Wright Cyclone 525 h.p.</td>
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<td>Curtiss-Wright Travel Air 4D, 3POLB, Wright R-760 240 h.p.</td>
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<td>Stinson SM-8A, 4PCLM, Lycoming R-680</td>
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<td>American Eagle American Eaglet Model B2POLM, Menasco B-4 95 h.p.</td>
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<td>Verville 104, 4PCLM, R-760 240 h.p.</td>
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<td>Roe Avian Special, 2POLB, Menasco B-4 95 h.p.</td>
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<td>Curtiss Wright Travel Air A-6000-A Special, 7PCLM, Wasp 420 h.p.</td>
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### ENGINES ISSUED APPROVED TYPE CERTIFICATES

December 31, 1930

**Kev:** 4—number of cylinders; R—radial (arrangement); V—vee (arrangement); L—in line (arrangement); I—inversed; A—air cooled; W—water-cooled; G—gear drive.

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<td>Warner, Searab</td>
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DOMESTIC ENGINES APPROVED FOR LICENSE WITHOUT APPROVED TYPE CERTIFICATES

December 31, 1930

Key: 4—number of cylinders; R—radial (arrangement); V—vee (arrangement); L—in line (arrangement); A—air cooled; W—water-cooled; G—gear drive.

<table>
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<th>Model</th>
<th>Description</th>
<th>Rated H.P.</th>
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<td>Curtiss</td>
<td>OXX-6</td>
<td>8 VW</td>
<td>102</td>
<td>1400</td>
</tr>
<tr>
<td>...</td>
<td>Curtiss</td>
<td>C-6</td>
<td>6 LW</td>
<td>160</td>
<td>1750</td>
</tr>
<tr>
<td>...</td>
<td>Hall-Scott</td>
<td>K-5</td>
<td>6 LW</td>
<td>150</td>
<td>1700</td>
</tr>
<tr>
<td>...</td>
<td>Liberty</td>
<td>12-A</td>
<td>12VW</td>
<td>400</td>
<td>1700</td>
</tr>
<tr>
<td>...</td>
<td>Wright Hispano</td>
<td>A</td>
<td>8 VW</td>
<td>150</td>
<td>1450</td>
</tr>
<tr>
<td>...</td>
<td>Wright Hispano</td>
<td>D</td>
<td>8 VW</td>
<td>200</td>
<td>2200</td>
</tr>
<tr>
<td>...</td>
<td>Wright Hispano</td>
<td>E</td>
<td>8 VW</td>
<td>180</td>
<td>1800</td>
</tr>
<tr>
<td>...</td>
<td>Wright Hispano</td>
<td>I</td>
<td>8 VW</td>
<td>150</td>
<td>1450</td>
</tr>
<tr>
<td>6-6-29</td>
<td>Wright Hispano</td>
<td>H</td>
<td>8 VW</td>
<td>300</td>
<td>1800</td>
</tr>
</tbody>
</table>

ENGINES MANUFACTURED IN FOREIGN COUNTRIES WHICH ARE TEMPORARILY APPOINTED FOR LICENSE

December 31, 1930

Key: 4—number of cylinders; R—radial (arrangement); V—vee (arrangement); L—in line (arrangement); A—air cooled; W—water-cooled; G—gear drive; *—subject to special condition.

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
<th>Model</th>
<th>Description</th>
<th>Rated H.P.</th>
<th>Rated R.P.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-26-29</td>
<td>Armstrong Siddeley (Fairchild)</td>
<td>Genet Mark II</td>
<td>RA</td>
<td>80</td>
<td>2200</td>
</tr>
<tr>
<td>1-11-29</td>
<td>*Bristol (Bliss)</td>
<td>Jupiter</td>
<td>RA G</td>
<td>400</td>
<td>1765</td>
</tr>
<tr>
<td>3-8-29</td>
<td>*Bristol (Bliss)</td>
<td>Jupiter</td>
<td>RA G</td>
<td>500</td>
<td>2000</td>
</tr>
<tr>
<td>3-9-29</td>
<td>Cirrus (American Cirrus Co.)</td>
<td>Mark III</td>
<td>LA</td>
<td>85</td>
<td>1900</td>
</tr>
<tr>
<td>9-17-28</td>
<td>DeHaviland (Moth)</td>
<td>Gipsy</td>
<td>LA</td>
<td>85</td>
<td>1900</td>
</tr>
<tr>
<td>2-11-29</td>
<td>Junkers</td>
<td>L-5</td>
<td>LA 4</td>
<td>300</td>
<td>1400</td>
</tr>
<tr>
<td>9-12-28</td>
<td>*Salmon (Aeromarine)</td>
<td>AD-9</td>
<td>RA</td>
<td>40</td>
<td>2000</td>
</tr>
<tr>
<td>11-1-28</td>
<td>Siemens Halske (Frank)</td>
<td>SH-2</td>
<td>RA</td>
<td>60</td>
<td>1510</td>
</tr>
<tr>
<td>3-25-28</td>
<td>Siemens Halske (Frank)</td>
<td>SH-10</td>
<td>RA</td>
<td>70</td>
<td>1557</td>
</tr>
<tr>
<td>3-25-28</td>
<td>Siemens Halske (Frank)</td>
<td>SH-11</td>
<td>RA</td>
<td>100</td>
<td>1584</td>
</tr>
<tr>
<td>2-14-29</td>
<td>Siemens Halske (Frank)</td>
<td>SH-12</td>
<td>RA</td>
<td>128</td>
<td>1736</td>
</tr>
<tr>
<td>6-10-29</td>
<td>Siemens Halske (Frank)</td>
<td>SH-13</td>
<td>RA</td>
<td>80</td>
<td>1710</td>
</tr>
<tr>
<td>6-10-29</td>
<td>Siemens Halske (Frank)</td>
<td>SH-14</td>
<td>RA</td>
<td>110</td>
<td>1720</td>
</tr>
<tr>
<td>9-4-28</td>
<td>Walter (Wills C. Brown)</td>
<td>NZ</td>
<td>RA</td>
<td>120</td>
<td>1600</td>
</tr>
</tbody>
</table>

GLIDERS APPROVED FOR LICENSE WITHOUT APPROVED TYPE CERTIFICATE

December 31, 1930

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
</table>

GLIDERS HAVING APPROVED TYPE CERTIFICATES

December 31, 1930

<table>
<thead>
<tr>
<th>A.T.C. No.</th>
<th>Date</th>
<th>Description</th>
<th>Weight</th>
<th>Useful Load</th>
<th>Gross Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>G-1</td>
<td>6-20-39</td>
<td>Detroit, Gull Model G-1, t POLM. Primary Training</td>
<td>200</td>
<td>170</td>
<td>370</td>
</tr>
</tbody>
</table>
APPENDIX

PONTOONS APPROVED FOR USE ON LICENSED AIRCRAFT

December 31, 1930

<table>
<thead>
<tr>
<th>Date</th>
<th>Manufacturer</th>
<th>Model</th>
<th>No. per Airplane</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-9-28</td>
<td>Edo</td>
<td>C</td>
<td>2</td>
</tr>
<tr>
<td>5-9-28</td>
<td>Edo</td>
<td>DeLuxe</td>
<td>2</td>
</tr>
<tr>
<td>5-9-28</td>
<td>Edo</td>
<td>E-1</td>
<td>2</td>
</tr>
<tr>
<td>7-16-28</td>
<td>Hamilton</td>
<td>Series F</td>
<td>2</td>
</tr>
<tr>
<td>8-9-28</td>
<td>Hamilton</td>
<td>Series D</td>
<td>2</td>
</tr>
<tr>
<td>1-8-29</td>
<td>Edo</td>
<td>P-6</td>
<td>1</td>
</tr>
<tr>
<td>2-7-29</td>
<td>Brewster</td>
<td>B-5500</td>
<td>1</td>
</tr>
<tr>
<td>3-21-29</td>
<td>Edo</td>
<td>J</td>
<td>2</td>
</tr>
<tr>
<td>3-21-29</td>
<td>Edo</td>
<td>K</td>
<td>2</td>
</tr>
<tr>
<td>8-13-29</td>
<td>Edo</td>
<td>P (Model 3369)</td>
<td>2</td>
</tr>
<tr>
<td>8-13-29</td>
<td>Edo</td>
<td>P-2</td>
<td>2</td>
</tr>
<tr>
<td>9-27-29</td>
<td>Fairchild</td>
<td>P-2-B</td>
<td>2</td>
</tr>
<tr>
<td>10-15-29</td>
<td>Edo</td>
<td>L (Model 2262)</td>
<td>2</td>
</tr>
<tr>
<td>10-15-29</td>
<td>Edo</td>
<td>M (Model 2665)</td>
<td>2</td>
</tr>
<tr>
<td>12-16-29</td>
<td>Fairchild</td>
<td>P-20</td>
<td>2</td>
</tr>
<tr>
<td>1-28-30</td>
<td>Great Lakes</td>
<td>1334</td>
<td>2</td>
</tr>
</tbody>
</table>

Maximum Allowable Airplane Weight

<table>
<thead>
<tr>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,580</td>
</tr>
<tr>
<td>2,650</td>
</tr>
<tr>
<td>4,150</td>
</tr>
<tr>
<td>5,230</td>
</tr>
<tr>
<td>5,340</td>
</tr>
<tr>
<td>5,470</td>
</tr>
<tr>
<td>5,500</td>
</tr>
<tr>
<td>5,530</td>
</tr>
<tr>
<td>4,880</td>
</tr>
<tr>
<td>1,030</td>
</tr>
<tr>
<td>2,810</td>
</tr>
<tr>
<td>1,575</td>
</tr>
<tr>
<td>1,500</td>
</tr>
</tbody>
</table>

PROPELLERS HAVING APPROVED TYPE CERTIFICATES

December 31, 1930

Key: W—Wood; A—Aluminum Alloy; S—Steel; C—Special non-metallic composition

<table>
<thead>
<tr>
<th>A.T.C. No.</th>
<th>Issued</th>
<th>Propeller</th>
<th>M'tl Diameter</th>
<th>Pitch</th>
<th>H.P. R.P.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1928-1929</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 9-6-28</td>
<td>1</td>
<td>Standard Steel No. 1600.</td>
<td>A 8' 6&quot;</td>
<td>Adj. 100</td>
<td>@ 1,500</td>
</tr>
<tr>
<td>2 9-7-28</td>
<td>2</td>
<td>Paragon Monoid.</td>
<td>C 8' 6&quot;</td>
<td>Adj. 330</td>
<td>@ 2,000</td>
</tr>
<tr>
<td>3 1-23-29</td>
<td>3</td>
<td>Hamilton H-1207</td>
<td>A 9' 10&quot;</td>
<td>Adj. 500</td>
<td>@ 2,000</td>
</tr>
<tr>
<td>4 12-13-28</td>
<td>4</td>
<td>Hamilton H-1407</td>
<td>A 10' 6&quot;</td>
<td>Adj. 400</td>
<td>@ 2,000</td>
</tr>
<tr>
<td>5 12-14-28</td>
<td>5</td>
<td>Hamilton H-1408</td>
<td>K 6'</td>
<td>Adj. 220</td>
<td>@ 2,000</td>
</tr>
<tr>
<td>6 3-13-29</td>
<td>6</td>
<td>Westinghouse Micarta.</td>
<td>C 7' 6&quot;</td>
<td>Adj. 550</td>
<td>@ 1,400</td>
</tr>
<tr>
<td>7 3-13-29</td>
<td>7</td>
<td>Westinghouse Micarta.</td>
<td>W 7' 6&quot;</td>
<td>Adj. 500</td>
<td>@ 1,400</td>
</tr>
<tr>
<td>8 3-13-29</td>
<td>8</td>
<td>Supreme No. 750</td>
<td>W 7' 6&quot;</td>
<td>Adj. 500</td>
<td>@ 1,400</td>
</tr>
<tr>
<td>9 3-15-29</td>
<td>9</td>
<td>American No. 1</td>
<td>W 7' 6&quot;</td>
<td>Adj. 100</td>
<td>@ 1,400</td>
</tr>
<tr>
<td>10 3-15-29</td>
<td>10</td>
<td>American No. 1</td>
<td>W 7' 6&quot;</td>
<td>Adj. 100</td>
<td>@ 1,400</td>
</tr>
</tbody>
</table>

| 1929       |        |           |                |       |             |
| 11         | 3-10   | Dakota Fahnin D-5090. | W 7' 6" | 3' 8" to 5' 6" | @ 1,515 |
| 12         | 3-22   | American No. 12 | W 7' 6" | 5' 6" to 6' 6" | @ 2,000 |
| 13         | 4-24   | Paragon No. 69-A | W 7' 6" | 6' 9" to 7' 6" | @ 2,000 |
| 14         | 5-24   | Paragon No. 69-B | W 7' 6" | 6' 6" to 7' 6" | @ 2,000 |
| 15         | 5-11   | Hamilton H-403 | W 7' 6" | 4' 6" | @ 1,300 |
| 16         | 5-22   | Master No. 103 | W 7' 6" | 4' 6" | Adj. 220 | @ 2,000 |
| 17         | 6-19   | Standard Steel No. 6991 | A 7' 6" | 6' 6" | Adj. 225 | @ 2,900 |
| 18         | 6-13   | Hamilton HB-1215—H-5440-A | A 7' 6" | 6' 6" | Adj. 225 | @ 2,900 |
| 19         | 6-13   | Hamilton HB-1215—H-5155-A | A 7' 6" | 6' 6" | Adj. 225 | @ 2,900 |
| 20         | 6-13   | Hamilton HB-1215—H-5090 | A 7' 6" | 6' 6" | Adj. 225 | @ 2,900 |
| 21         | 6-13   | Hamilton HB-1301—H-5144 | A 7' 6" | 6' 6" | Adj. 225 | @ 2,900 |
| 22         | 6-13   | Hamilton HB-1301—H-5149-A | A 7' 6" | 6' 6" | Adj. 225 | @ 2,900 |
| 23         | 6-13   | Hamilton HB-1301—H-5149-A | A 7' 6" | 6' 6" | Adj. 225 | @ 2,900 |
| 24         | 6-13   | Hamilton HB-1301—H-5149-A | A 7' 6" | 6' 6" | Adj. 225 | @ 2,900 |
| 25         | 6-13   | Hamilton HB-1301—H-5149-A | A 7' 6" | 6' 6" | Adj. 225 | @ 2,900 |
| 26         | 6-13   | Hamilton HB-1301—H-5149-A | A 7' 6" | 6' 6" | Adj. 225 | @ 2,900 |
| 27         | 6-13   | Hamilton HB-1301—H-5149-A | A 7' 6" | 6' 6" | Adj. 225 | @ 2,900 |
| 28         | 6-13   | Hamilton HB-1301—H-5149-A | A 7' 6" | 6' 6" | Adj. 225 | @ 2,900 |
| 29         | 7-1    | Hartzell 368 | W 8' 6" | Adj. 220 | @ 2,000 |
| 30         | 7-1    | Hartzell 368 | W 8' 6" | Adj. 220 | @ 2,000 |
| 31         | 7-2    | Standard Steel 1A1-O | A 7' 6" | 6' 6" | Adj. 700 | @ 2,500 |
| 32         | 7-2    | Standard Steel 1A1-2 | A 7' 6" | 6' 6" | Adj. 680 | @ 2,500 |
| 33         | 7-2    | Standard Steel 1A1-4 | A 7' 6" | 6' 6" | Adj. 680 | @ 2,500 |
| 34         | 7-2    | Standard Steel 1A1-A | A 7' 6" | 6' 6" | Adj. 680 | @ 2,500 |
| 35         | 7-2    | Standard Steel 1A1-B | A 7' 6" | 6' 6" | Adj. 680 | @ 2,500 |
| 36         | 7-2    | Standard Steel 1A1-6 | A 7' 6" | 6' 6" | Adj. 680 | @ 2,500 |
| 37         | 7-2    | Standard Steel 1A1-6A | A 7' 6" | 6' 6" | Adj. 680 | @ 2,500 |
| 38         | 7-2    | Standard Steel 1A1-6B | A 7' 6" | 6' 6" | Adj. 680 | @ 2,500 |
| 39         | 7-2    | Standard Steel 1A1-61 | A 7' 6" | 6' 6" | Adj. 680 | @ 2,500 |
| 40         | 7-2    | Standard Steel 1A1-8 | A 7' 6" | 6' 6" | Adj. 680 | @ 2,500 |
AIRCRAFT YEAR BOOK
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III
II2

9-12
9-26

113

9-26

II4

II5

9-26
9-26

Propellers
Stan dard Steel IAI- 9 ... . .... . .. .
Standard Ste el r Ar-10 . ... . . .... .
Stan da r d Steel rAI- I 2 ..... . . . •..
Standard Steel rA r-r 2A .. .... ... .
Stand a rd Stee l u\ r-r S ...... .. . . .
Standa rd Steel r A r- 22 . .. . . .. . . . .
Stand a rd Stee l r A r - 24 ... . . . .. . . .
Stand a r d Steel r A r ~ -0 .... . . .. . . .
Stan da rd St eel 3A r-0 ..... . . .. .. .
Standard Steel 3A 1-6 .. .... . . . .. .
Standard Steel 3Ar -8 .• .. . .......
Sta ndard Steel 3A 1-9 . ....... ... .
Sta nd a rd Steel 3A r-r 2 .......... .
Standard St ee l 3A 1-20 .. ........ .
Standard Stee l 5BI-0 .. . ... ..... .
Standard Steel sB I-I .. . .. .. . . .. .
Standa r d Steel 5 B I- 2 . . . . ... . ... .
Standard Steel 5B r-3 ...... . . ... .
Standard Steel 5B I-4 . .. ... . .. .. .
Standar d Steel s B I- 6 ...... • . ....
Standard Ste el sBI-6A ... . . . . . . . .
Standard Stee l sBr -613 .... .. .. .. .
Standard Steel sBr-7 . .. . .. . .... .
Standard Steel sBI-8 . . ... . ..... .
Standar d Steel sBI-Io . .. ..... .. .
Standard Steel sB I-I I . . . . . . .. . . .
Standard Ste el 513 1·12 .. . . . . . .. . .
Standar d Steel sB1-14 ... . . ... .. .
Standard Steel sBI-1S . .. . . . . ... .
Standard Steel sB1 - 24 .. ..... ... .
Standard Steel 7C1 -0 .......... . .
Standar d Steel 7Cr 1-0 . .. ..... . . .
Standar d Stee l 7CI-I ........... .
Standar d ~tee! 7Cr-3 ......... . . .
Standard Stee l 7CI -S .. . . ... . ... .
Standard Stee l 7C I -9 .....•......
Standa r d Steel 7Cr -r s ..... . .... .
Standard Steel 7CI-I7 .......... .
Standard Steel 7Cr - z r ..... . . ... .
Standard Steel 7Cr-23 . .... • . ... .
Standard Steel 7CI-24 ... .. . .... .
Standar d Steel 7CI~ - 3 .......... .
Sta n da r d Steel 7C r ~ -2 4 . ...... . . .
Paragon Engin eer s 40-F .. ... ... .
Paragon En g ineers So-A . . ... . .. .
Gardner No. 567 . . .... ..... .. . .
J acuzzi No . 3 .... . .... .. . . .. ... .
Flottorp Standard OX-s . .. . • . .. .
Standard Steel 9CI} - 24 ........ . .
Standard Steel 9C2-6 . . ..... .... .
Standard Steel 9C2 -9 .... ...• .. ..
Standard S t eel 9C2-24 . ... . .. . .. .
Standard Steel 9CI -2 .. .... .. ... .
Standard Steel 9C r-6 ........... .
Standard Steel 9CI-8 .... .. .. ... .
Standard Steel 9Cr-9 . ....... . .. .
Standard Steel 9Cr-s! .... . ... .. .
Standard Steel 5BI-6C .. . ....... .
Standard Steel 9C r-r2 . . ...... . . .
Standard Steel 9C1 -r2 1 .. .... .. . .
Standard Steel 9C r-r8 . . .. .. . ... .
Stan da r d Steel 9CI-20 .. . ... ... . .
Standard Steel 9CI -24 .. . . .. .... .
Standard Steel 9C1-29 ........ . . .
Standar d Steel 9C1-30 . .... .. . . . .
Standard Steel 9C2-0 ....... . .. . .
Standard Steel 9C I-O . ... .. . .... .
Standard Steel 9Cr-OA ......... .
Standard Steel 9C r ]-0 . .
Curtiss Curtiss-Reed Typ~ · ':R'
EX-33505 . .. . ... ..... . .. .
Curtiss Curtiss-Reed 1:-ype R
EX-33073 .. . ......... . ...... .
Curtiss Curtiss-Reed Type R
EX-33079 . . . . ... . ....... . ... .
Curtiss Curtiss-Reed Type R
EX-33525 .... . .......•...••••

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225
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A

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Ad j.
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8' 2 11
Ad j.
8' o"
Ad j.
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Ad j .
Ad j .
ro' o"
Ad j.
9 1 8"
9' 6"
Adj.
Ad j.
9' 4 "
Adj.
9' 3 11
9' o"
Adj .
8' 4"
Adj.
8' o''
A d j.
9' o"
Ad j.
S' I I"
Adj.
S'ro''
Adj .
8' 9"
Ad j.
8' 8"
A d j.
8' 6"
A d j.
8' 6"
A d j.
8' 6"
Adj .
11
Adj.
8' 5
8' 4"
Adj .
8' 2 "
Adj .
8' r"
Adj.
8' o"
Adj .
7'10"
Adj.
7' 9"
Adj.
7' o''
Adj.
ro' 9"
Adj.
ro' o"
Adj.
1
10 8"
Ad j.
ro' '6'
Adj.
ro' 4 11
Adj.
ro'ro"
Adj.
9' 6"
Adj.
Adj.
9 1 4"
9' o"
Adj.
8' o"
Adj.
Adj.
8' 9 11
xo' 6"
Ad j .
Adj.
8' 9 11
6' 6"
4.50'
9' o" 5-0 1 to s.50 1
8' 6"
4-67'
9' o"
s'6"
8' 61''
s'o"
8' 6"
Adj.
xo' o"
Adj.
Ad j .
9 1 9"
8' 6"
Adj.
Adj.
ro' 4"
ro' o''
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9'xo"
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9 9
Adj .
ro' ~"
Adj.
8' 6''
1
Adj.
9 6"
Adj.
9' s;"
Adj.
9' o"
8'ro"
Adj.
Adj.
8' 6"
Adj.
8' r"
8' o"
Adj.
ro' 6"
Adj.
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I0 6'
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I0 1 6' 1
Adj.
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10 6''
Adj.

A

ro' o''

7'9"

525 @ r,6oo

A

8' 9

11

6'6"

525 @ 2,000

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9 1 3''

7'9"

525 @ 1,775

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9'

o''

s'6"

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9' o"

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sao @ 2,zoo
5so- ® z,2oo

550· @ 2,200

sso

@

2,2QQ .

S50 @ 2,200


## APPENDIX

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<th>Date Issued</th>
<th>Propeller</th>
<th>M'Dl Diameter</th>
<th>Pitch</th>
<th>H.P. R.P.M.</th>
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Am 12-20 Curtis Curtiss-Reed Type D EX-31900 | A | 9° 0" | 60°7" | 225 @ 2,000 |
# PARACHUTES ISSUED APPROVED TYPE CERTIFICATES

**December 31, 1930**

**KEY:** Fm Ft—form fitting; Str—straight

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<th>A.T.C. No.</th>
<th>Dates Issued and Amended</th>
<th>Manufacturer</th>
<th>Model Designation</th>
<th>Pack Type</th>
<th>Canopy Type</th>
<th>Diameter Canopy</th>
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</tr>
<tr>
<td>Curtiss Flying Service</td>
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<td>Boeing School of Aeronautics</td>
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<td>Oakland Municipal Airport</td>
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<td>Oakland, Calif.</td>
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<td>119 W. 57th St.</td>
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<td>New York, N. Y. (Ground)</td>
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Note: The table lists the approved flying schools and the ratings for which certificates were issued, along with the dates of issuance.
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<th>Location</th>
<th>Rating for which Approved</th>
<th>Approved Certificate Issued</th>
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<tr>
<td>Curtiss Flying Service of Indiana Stout Field, Mars Hill Indianapolis, Ind.</td>
<td>Ground and Flying</td>
<td>Lim. Commercial 11-7-29</td>
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<tr>
<td>Curtiss Flying Service of South Memphis Municipal Airport Memphis, Tenn.</td>
<td>Ground and Flying</td>
<td>Transport 6-26-29</td>
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<tr>
<td>Tenn School of Aviation Pittsburgh-Butler Airport Butler, Pa.</td>
<td>Ground and Flying</td>
<td>Transport 12-12-29</td>
</tr>
<tr>
<td>Curtiss Flying Service of Kentucky Bowman Field Louisville, Ky.</td>
<td>Ground and Flying</td>
<td>Transport 7-23-29</td>
</tr>
<tr>
<td>Curtiss-Wright Flying Service 55 Allyn Street (Ground) Hartford, Conn.</td>
<td>Ground and Flying</td>
<td>Transport 1-18-30</td>
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<tr>
<td>Curtiss-Wright Flying Service 115 High St. (Ground) Portland, Me. Portland Airport (Flying) Scarborough, Me.</td>
<td>Ground and Flying</td>
<td>Lim. Commercial 3-5-30</td>
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<tr>
<td>Curtiss-Wright Flying Service Grant Columbus Columbus, O. Lincoln Airplane &amp; Flying School 2415 O St. Lincoln, Nebr. (Ground) Municipal Airport Lincoln, Nebr. (Flying)</td>
<td>Ground and Flying</td>
<td>Transport 3-31-30</td>
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<tr>
<td>Yellow Cab School of Aviation Municipal Airport Des Moines, Ia.</td>
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<td>Lim. Commercial 4-3-30</td>
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<tr>
<td>Altoona Aircraft Corp. Stultz Field Tyrone, Pa.</td>
<td>Ground and Flying</td>
<td>Lim. Commercial 4-22-30</td>
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<tr>
<td>Curtiss-Wright Flying Service North Carolina State College (Ground) Raleigh Airport (Flying) Raleigh, N. Car.</td>
<td>Ground and Flying</td>
<td>Lim. Commercial 4-28-30</td>
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<tr>
<td>Hancock Found., College of Aeron. Santa Maria Airport Santa Maria, Calif.</td>
<td>Ground and Flying</td>
<td>Transport 4-30-30</td>
</tr>
<tr>
<td>Curtiss-Wright Flying Service Curtiss-Wright Airport Dalworth, Tex.</td>
<td>Ground and Flying</td>
<td>Lim. Commercial 5-16-30</td>
</tr>
<tr>
<td>Pitsaurn Aviation of Pa., Inc. Pitsaurn Field Willow Grove, Pa.</td>
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<tr>
<td>Curtiss-Wright Flying Service Curtiss-Wright Airport Logan Field-Auxiliary Baltimore, Md.</td>
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<td>Curtiss-Wright Flying 613 Grant Blvd. Pittsburgh, Pa. (Ground) Curtiss-Bettis Airport McKeesport, Pa. (Flying)</td>
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<td>Lim. Commercial 6-16-30</td>
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<tr>
<td>Nepco Tri-City Flying Service Nepco Tri-City Airport Wisconsin Rapids, Wisc.</td>
<td>Ground and Flying</td>
<td>Transport 6-16-30</td>
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<tr>
<td>Curtiss-Wright Flying Service Curtiss-Wright Airport San Mateo, Calif.</td>
<td>Ground and Flying</td>
<td>Lim. Commercial 6-26-30</td>
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## AIRWAY MARKING AND LIGHTING IN 1930

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<th>Airway</th>
<th>LIGHTING</th>
<th>WEATHER</th>
<th>RADIO</th>
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<tr>
<td>Albuquerque—Wichita</td>
<td>305</td>
<td>10</td>
<td>23</td>
</tr>
<tr>
<td>Atlanta—Chicago</td>
<td>655</td>
<td>23</td>
<td>51</td>
</tr>
<tr>
<td>Atlanta—New York</td>
<td>788</td>
<td>33</td>
<td>76</td>
</tr>
<tr>
<td>Brownsville—Pittsburgh</td>
<td>219</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Brownsville—Portland</td>
<td>120</td>
<td>0</td>
<td>12</td>
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<tr>
<td>Chicago—New York</td>
<td>749</td>
<td>41</td>
<td>73</td>
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<tr>
<td>Chicago—Twin Cities</td>
<td>472</td>
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<td>42</td>
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<tr>
<td>Cincinnati—Chicago</td>
<td>214</td>
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<tr>
<td>Cleveland—Albany</td>
<td>459</td>
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<tr>
<td>Cleveland—Detroit</td>
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<td>Dallas—Kansas City</td>
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<td>Kansas City—Chicago</td>
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<td>Kansas City—Omaha</td>
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<td>Los Angeles—Albuquerque</td>
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<td>Los Angeles—Salt Lake</td>
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<td>Louisville—Cleveland</td>
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<td>Miami—Atlanta</td>
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<td>Michigan Airways</td>
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<td>Milwaukee—Green Bay</td>
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<td>New Orleans—Atlanta</td>
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<td>New York—Boston</td>
<td>201</td>
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<td>New York—Montreal</td>
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<td>Omaha—Chicago</td>
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<td>Pueblo—Cheyenne</td>
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<td>Salt Lake—Great Falls</td>
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<td>Salt Lake—Omaha</td>
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<td>Salt Lake—Pasco</td>
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<tr>
<td>San Francisco—Salt Lake</td>
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<td>San Francisco—Seattle</td>
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<td>St. Louis—Columbus</td>
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<td>Portland—Spokane (Portland—Pasco Section)</td>
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<td>St. Louis—Chicago</td>
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<td>St. Louis—Evansville</td>
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<td>Tulsa—Ponca City</td>
<td>176</td>
<td>7</td>
<td>15</td>
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<tr>
<td>Washington—Cleveland</td>
<td>135</td>
<td>11</td>
<td>7</td>
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<tr>
<td>Pittsburgh—Cleveland</td>
<td>135</td>
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<td><strong>Total</strong></td>
<td><strong>13,459</strong></td>
<td><strong>575</strong></td>
<td><strong>1,099</strong></td>
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Under Construction as of June 30th:

- Brownsville—Pittsburgh
- Columbus—Philadelphia
- New Orleans—St. Louis
- Texarkana—Fort Smith
- Oklahoma City—Wichita
- Portland—Spokane
- Salt Lake—Great Falls
- St. Louis—Indiansapolis
- Washington—Cleveland

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<td>Portland—Spokane</td>
<td>7-31-30</td>
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<tr>
<td>Seattle—Spokane</td>
<td>8-21-30</td>
</tr>
<tr>
<td>Los Angeles—San Francisco</td>
<td>7-31-30</td>
</tr>
<tr>
<td>Portland—Spokane</td>
<td>8-21-30</td>
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<td>Portland—Pasco</td>
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<tr>
<td>St. Louis—Columbus</td>
<td>7-31-30</td>
</tr>
<tr>
<td>Portland—Spokane</td>
<td>8-21-30</td>
</tr>
</tbody>
</table>

**APPENDIX**
U. S. AIR CORPS, WAR DEPARTMENT
Officers on Duty in Washington

F. Trubee Davison...........................................Assistant Secretary of War
Maj. Gen. James E. Fechet...................................Chief of the Air Corps
Brig. Gen. B. D. Foulkes..................................Assistant Chief of the Air Corps

Colonels—Hathaway, L. M. (MC).

Air Corps Posts

AKRON, OHIO—Balloon Production & Inspection. Procurement Section, District Office (Chief of the Air Corps) P. 0. c/o Goodyear Tire & Rubber Co., Akron, Ohio.
ARMSTRONG, FT.—(Hq.) P. 0. Honolulu, T. H. Air Depot.
BRAGG, FT.—(Fourth Corps Area) P. O. Ft. Bragg, N. C. 2d Balloon Co.
BRIXTON, PA.—(Chief of the Air Corps) P. O. Bristol, Pa. Air Corps Representative.
KEYSTONE Aircraft Corp.
BURGESS FIELD—(Chief of the Air Corps) P. O. Uniontown, Pa. Intermediate Landing Field.
CHANUTE FIELD—(Chief of the Air Corps) P. O. Rantoul, Ill. Technical School. School Troops. Air Corps Band.
CHICAGO, ILL.—(Chief of the Air Corps) P. O. 1819 W. Pershing Road, Chicago, Ill. Procurement Planning Representative. Air Corps Procurement Dist.
CLARK FIELD—(P. Dept.) P. O. Camp Skotsenburg, P. J. 3d Pursuit Sq.
CLARK, FT.—(Eighth Corps Area) P. O. Brackettville, Texas. Airdrome. Intermediate Landing Field.
CRISPY FIELD—(Ninth Corps Area) P. O. Presidio of San Francisco, Cal. 91st Obs. Sq. 13th Photo Section.
CROCKETT, FT.—(Eighth Corps Area) P. O. Galveston, Texas. Hq. 3d Attack Gp. 8th, 90th, 96th Sq. 60th Service Sq. 13th Attack Sq. Air Corps Band.
CUMBERLAND FIELD—(Chief of the Air Corps) P. O. Cumberland, Md. Intermediate Landing Field.
DETROIT, MICH.—(Chief of the Air Corps) P. O. 802 Farwell Bldg., Detroit, Mich. Procurement Planning Representative. Air Corps Procurement Dist.
DOOD FIELD—(Eighth Corps Area) P. O. Ft. Sam Houston, Texas. Airdrome, 12th Obs. Sq. 1st Photo Section.
DUNCAN FIELD—(Chief of the Air Corps) P. O. San Antonio, Texas. Air Corps Training Center. Supply and Repair Depot.
EDGWOOD ARSENAL—P. O. Edgewood, Md. Air Corps Detachment.
FAIRFIELD AIR DEPOT—(Chief of the Air Corps) P. O. Fairfield, Ohio. Supply & Repair Depot.
FRANCE FIELD—(P. C. Dept.) P. O. France Field, Canal Zone. 6th Composite Group Hq. 71st Obs. Sq. 12th Photo Sec. 63d Service Sq. 24th Pursuit Sq. 25th Bomb. Sq. Aerial Coast Defense. Air Corps Band. Panama Air Depot.
GARDEN CITY—(Chief of the Air Corps) P. O. Long Island, N. Y. Air Corps Representative Curtiss Aeroplane & Motor Corp.

Scott Field—(Chief of the Air Corps) P. O. Scott Field, Belleville, Ill. 9th Airship Co. 21st Airship Gp. Hq. 21st Photo Sec. 24th Airship Service Co. Balloon & Airship School. Air Depot, Flying Field.

Seattle—(Chief of the Air Corps) P. O. c/o Boeing Airplane Co., Georgetown Station, Seattle, Wash. District Procurement Office. Air Corps Representative, Boeing Airplane Co.

Selfridge Field—(Sixth Corps Area) P. O. Mt. Clemens, Mich. Hq. 1st Pursuit Gp. 57th Service Sq. 17th, 27th, 94th Pursuit Sqs. Flying Field. 8th Photo Section, 15th Observation Sq.


Wheeler Field (H Depl.) P. O. Schofield Barracks, Honolulu, T. H. Hq. 18th Pursuit Group, 6th, 15th Pursuit Sqs. Flying Field.


Organized Reserve Airdromes and Stations for Reserve Flying—Boston Airport, Bowman Field, Lunken Airport, Municipal Airport—Salt Lake City, Utah (formerly Woodward Field), Municipal Airport—Long Beach, Calif. (formerly Glover Field), Norton Field, Pearson Field, Pittsburgh Airport, Richards Field, Sand Point, Schoen Field.

Air Depots—Fairfield, Little Rock, Middletown, Rockwell, San Antonio, Scott Field. Special Service Schools—Advanced Flying School, Kelly Field, Texas; Primary Flying School, Brooks Field, Texas; Primary Flying School, March Field, Calif.; Tactical School, Langley Field, Hampton, Va.; Technical School, Chanute Field, Rantoul, Ill.; Engineering School, Wright Field, Dayton, Ohio; School of Aviation Medicine, Brooks Field, San Antonio, Texas; Balloon & Airship School, Scott Field, Belleville, Ill.

Note: Reserve flying also conducted at Air Corps stations at which one or more Air Corps units are operating.

Air Corps National Guard Units

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<th>Organization</th>
<th>P. O. Address</th>
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<td>102d Obs. Sq. &amp; Photo Sec.</td>
<td>N. Y. Nat. Gd., Miller Field, Staten Island, N. Y.</td>
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<tr>
<td>110th Obs. Sq. &amp; Photo Sec., Tex. Nat. Gd.</td>
<td>Houston, Texas</td>
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<tr>
<td>111th Obs. Sq., Ohio Nat. Gd.</td>
<td>Cleveland, Ohio</td>
</tr>
<tr>
<td>112th Obs. Sq. &amp; Photo Sec.</td>
<td>Ind. Nat. Gd., Indianapolis, Ind.</td>
</tr>
<tr>
<td>113th Obs. Sq. &amp; Photo Sec., Cal. Nat. Gd.</td>
<td>Los Angeles Airport, Griffith Park, Cal.</td>
</tr>
</tbody>
</table>

District Procurement and Planning Representative

| Buffalo                           | Wright Field |
| Chicago                           | New York     |
| Detroit                           | San Francisco |

Air Corps Procurement Districts

| Buffalo, N. Y.                    | 644 Elliott Square |
| Chicago, Ill.                     | 1819 W. Pershing Road |
| Cleveland, Ohio                   | Wright Field, Dayton, Ohio |
| Detroit, Mich.                    | 802 Farwell Bldg. |
| San Francisco, Calif.             | 39 Whitehall St. |
| New York, N. Y.                   | 369 Pine St. |
APPENDIX

Materiel Division
Wright Field, Dayton, Ohio
Brig. Gen. Henry C. Pratt, Chief of the Division

Executive ........................................ Maj. Henry H. Arnold
Assistant Executive.............................. Capt. Aaron E. Jones
Commanding Officer and Chief of Administration ... Maj. John D. Keardon
Chief Engineer .................................... Maj. Clinton W. Howard
Chief of Production ................................ Maj. Oliver P. Ebhols
Chief of Field Service ............................ Maj. Fred H. Coleman
Chief of Industrial War Plans ..................... Maj. W. H. Crom
Chief of Finance Budget .......................... Mr. C. E. Orton

Assistant Commandant—Air Corps Engineers .......... Capt. Grandison Gardner
Adjutant .......................................... Capt. J. G. Whitesides
Finance Officer .................................... Capt. L. H. Price
Flight Surgeon ..................................... Maj. E. C. Reinaiz
Quartermaster .................................... Capt. Elmer Hostetter
Constructing Quartermaster ........................ Capt. L. S. Doten
Signal Officer ...................................... Capt. A. M. Drake
Station Supply Officer .............................. Capt. B. C. Hill
Engineer Corps Representative ..................... Capt. W. T. Booth
Ordnance Corps Representative ..................... Maj. J. L. Hatcher
Signal Corps Representative ....................... Maj. Hugh Mitchell
Navy Corps Representative ........................ Lt. Spencer H. Warner

ARMY PURCHASES OF AERONAUTICAL EQUIPMENT
Fiscal Year 1939

Aircraft

Heavier-than-Air Equipment:

1. Airplanes and Spares:

<table>
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<tr>
<th>No.</th>
<th>Type</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>Pursuit Airplanes with Spares, Model P-12 B with R-1340 C engines</td>
<td>$1,534,167.77</td>
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<tr>
<td>63</td>
<td>Bombardment Airplanes with Spares, Model B-3A with R-1690 engines</td>
<td>$3,050,699.67</td>
</tr>
<tr>
<td>70</td>
<td>Observation Airplanes with Spares, Model O-19B with R-1340 C engines</td>
<td>$1,968,917.26</td>
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<tr>
<td>78</td>
<td>Attack Airplanes with Spares, Model A-33 with D-12 engines</td>
<td>$2,118,759.73</td>
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<tr>
<td>79</td>
<td>Observation Airplanes with Spares, Model O-23B with G-IV-1570 engines</td>
<td>$1,887,778.08</td>
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<tr>
<td>80</td>
<td>Observation Airplanes with Spares, Model O-32 with R-1340 C engines</td>
<td>$2,088,456.44</td>
</tr>
<tr>
<td>15</td>
<td>Training Airplanes with Spares, Model YPT-5 with Kinner engines</td>
<td>$72,508.50</td>
</tr>
<tr>
<td>16</td>
<td>Photographer Airplanes with Spares, Model YF-7</td>
<td>$91,566.66</td>
</tr>
<tr>
<td>17</td>
<td>Observation Airplane, Model XO-31</td>
<td>$17,590.00</td>
</tr>
</tbody>
</table>

2. Engines:

<table>
<thead>
<tr>
<th>No.</th>
<th>Type</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>128</td>
<td>Curtiss Engines D-12</td>
<td>$89,256.16</td>
</tr>
<tr>
<td>106</td>
<td>Curtiss Engines V-1570</td>
<td>$18,450.00</td>
</tr>
<tr>
<td>357</td>
<td>Pratt &amp; Whitney Engines R-1340</td>
<td>$2,156,935.53</td>
</tr>
<tr>
<td>282</td>
<td>Pratt &amp; Whitney Engines R-1690</td>
<td>$1,674,104.69</td>
</tr>
<tr>
<td>29</td>
<td>Kinner Engines</td>
<td>$47,590.00</td>
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</tbody>
</table>

(These are initial equipment for above airplanes)

3. Miscellaneous:

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1165</td>
<td>Parachutes</td>
<td>$190,791.40</td>
</tr>
<tr>
<td>197</td>
<td>Flying Suit—Winter</td>
<td>$36,501.40</td>
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<tr>
<td>301</td>
<td>Flying Suit—Summer</td>
<td>$14,855.11</td>
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<tr>
<td>2168</td>
<td>Pairs Goggles</td>
<td>$24,838.82</td>
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<tr>
<td>700</td>
<td>Helmets—Summer</td>
<td>$1,867.61</td>
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<tr>
<td>1420</td>
<td>Helmets—Winter</td>
<td>$1,450.28</td>
</tr>
<tr>
<td>3175</td>
<td>Aviators' Jackets</td>
<td>$3,013.35</td>
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<tr>
<td>480</td>
<td>Flying Coats—non-sinkable</td>
<td>$2,251.20</td>
</tr>
<tr>
<td>300</td>
<td>Gauntlets—Winter</td>
<td>$3,266.60</td>
</tr>
<tr>
<td>704</td>
<td>Face Masks</td>
<td>$1,006.39</td>
</tr>
<tr>
<td>6</td>
<td>Cameras, Type M-2A</td>
<td>$20,178.60</td>
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<tr>
<td>6</td>
<td>Cameras, Type K-10</td>
<td>$3,210.48</td>
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</tbody>
</table>
I enlisted men. Lighter-than-air... Heavier-than-air

Observation Model
Bombardment Model

No. Type
IO Administration Division
26 Financial Division
90 Flight Division

Strength of the Army Air Corps
Dec. 31, 1930
Commissioned Officers
Student Officers
Pilots
Enlisted men
Civilians

Strength of Air Corps Organized Reserves
Officers
Pilots and Observers

Army Flying Time and Distances
1930
Heavier-than-air
Lighter-than-air

Miles flown

AIRPLANES DELIVERED TO U. S. ARMY IN 1930
Fiscal Year

No. Type and Model
59 Attack Model A-3B
14 Bombardment Model LB-6
1 Bombardment Model LB-10
1 Bombardment Model LB-11
1 Bombardment Model LB-9
1 Bombardment Model E-2
1 Observation Model O-20
1 Observation Model O-19A
1 Observation Model O-22A
35 Observation Model O-1E
1 Observation Model O-1F
35 Observation Model O-19B
3 Observation Model O-25B
1 Observation Model O-26
1 Observation Model Y-O-23
15 Observation Model O-25A
3 Observation Model O-13-C
10 Pursuit Model P-6
89 Pursuit Model P-12-B
26 Primary Training Model PT-3A
39 Primary Training Model YPT-6
30 Basic Training Model BT-2A
3 Cargo Model C-9
1 Cargo Model C-6
3 Cargo Model C-7-A
8 Photo Model YF-1

Contractor
Curtiss Aeroplane & Motor Co., Inc.
Keystone Aircraft Corp., Inc.
Keystone Aircraft Corp., Inc.
Keystone Aircraft Corp., Inc.
Curtiss Aeroplane & Motor Co., Inc.
Thomas Morse Aircraft Company
The Douglas Company
Curtiss Aeroplane & Motor Co., Inc.
Curtiss Aeroplane & Motor Co., Inc.
Curtiss Aeroplane & Motor Co., Inc.
Curtiss Aeroplane & Motor Co., Inc.
The Douglas Company
Boeing Airplane Company
Consolidated Aircraft Corporation
Fleet Aircraft Incorporated
Ford Motor Company
Silversky Aviation Corporation
Fokker Airlcaft Corporation
Fairchild Airplane Mfg. Co.

BUREAU OF AERONAUTICS, NAVY DEPARTMENT
Chief of Bureau... Rear Admiral William A. Moffett
Assistant Chief of Bureau... Captain John H. Towers
Financial Division... Comdr. E. A. Cobey (SC)
**APPENDIX**

**Materiel Division**

**Marine Corps Aviation**

**Naval Air Stations**

<table>
<thead>
<tr>
<th>Name</th>
<th>Commanding Officer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hampton Roads, Va.</td>
<td>Kenneth Whiting, Captain</td>
</tr>
<tr>
<td>Anacostia, D. C.</td>
<td>Albert W. Marshall, Rear Admiral</td>
</tr>
<tr>
<td>Coco Solo, C. Z.</td>
<td>Comdr. Alva D. Bernhard, Comdr.</td>
</tr>
<tr>
<td>Pearl Harbor, T. H.</td>
<td>Victor D. Herbst, Comdr.</td>
</tr>
</tbody>
</table>

**Marine Flying Fields**

<table>
<thead>
<tr>
<th>Name</th>
<th>Commanding Officer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantico, Va.</td>
<td>Major Roy S. Geiger</td>
</tr>
<tr>
<td>San Diego, Calif.</td>
<td>Major Ross E. Rowell</td>
</tr>
<tr>
<td>Port au Prince, Haiti.</td>
<td>Major James E. Davis</td>
</tr>
<tr>
<td>Managua, Nicaragua</td>
<td>Major Ralph J. Mitchell</td>
</tr>
<tr>
<td>Sunay, Guam</td>
<td>Captain Harold D. Campbell</td>
</tr>
</tbody>
</table>

**Carrier Divisions**

Commander—Rear Admiral Joseph M. Reeves.
(Additional duty as Commander Carrier Division Two.)
Chief of Staff—Captain Arthur B. Cook.
Commander, Carrier Division One—Captain Frederick J. Horne.
U. S. S. Lexington—Commanding Officer—Captain Ernest J. King.
U. S. S. Saratoga—Commanding Officer—Captain Frank E. McCrory.
U. S. S. Langley—Commanding Officer—Captain Rufus F. Zogbaum.

**Airship**


**Naval Aircraft Factory**


**Special Aviation Duty**

Aide to Asst. Secretary of the Navy (Air) .......... Lt. Comdr. Robert P. Molten
Aide to Commander-in-Chief, Battle Fleet .......... Lt. Comdr. Gail Morgan
Aide to Commander, Scouting Fleet .......... Lt. Comdr. William D. Thomas
Board of Inspection & Survey .......... Lt. Thomas P. Jeter
Bureau of Navigation .......... Comdr. Wadleigh Capehart
Bureau of Ordnance .......... Lt. Frederick A. Entwistle
Bureau of Engineering .......... Lt. Herbert C. Redd
Hydrographic Office .......... Lt. John F. W. Vest

**NAVY PURCHASES OF AERONAUTICAL EQUIPMENT**

**Fiscal Year 1930**

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fighting Planes</td>
<td>$1,181,082.92</td>
</tr>
<tr>
<td>Observation Planes</td>
<td>$1,234,240.00</td>
</tr>
<tr>
<td>Patrol Planes</td>
<td>$4,634,979.55</td>
</tr>
<tr>
<td>Torpedo Planes</td>
<td>$993,140.00</td>
</tr>
<tr>
<td>Scouting Plane</td>
<td>$35,550.00</td>
</tr>
<tr>
<td>Training Planes</td>
<td>$266,646.72</td>
</tr>
<tr>
<td>Transport Planes</td>
<td>$140,079.40</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$6,292,896.59</strong></td>
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</tbody>
</table>
### Aircraft Engines Delivered to U. S. Navy in 1930

<table>
<thead>
<tr>
<th>Model</th>
<th>Number Delivered</th>
<th>Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-760</td>
<td>59</td>
<td>Wright Aeronautical Corporation</td>
</tr>
<tr>
<td>R-1210</td>
<td>2</td>
<td>Wright Aeronautical Corporation</td>
</tr>
<tr>
<td>R-1620E</td>
<td>2</td>
<td>Wright Aeronautical Corporation</td>
</tr>
<tr>
<td>R-975</td>
<td>3</td>
<td>Wright Aeronautical Corporation</td>
</tr>
<tr>
<td>V-1110</td>
<td>2</td>
<td>Wright Aeronautical Corporation</td>
</tr>
<tr>
<td>R-1340C</td>
<td>112</td>
<td>Pratt &amp; Whitney Aircraft Co.</td>
</tr>
<tr>
<td>R-370</td>
<td>18</td>
<td>Kinner Aeroplane &amp; Motor Co.</td>
</tr>
<tr>
<td>R-1340D</td>
<td>3</td>
<td>Pratt &amp; Whitney Aircraft Co.</td>
</tr>
<tr>
<td>R-985</td>
<td>4</td>
<td>Pratt &amp; Whitney Aircraft Co.</td>
</tr>
<tr>
<td>V-1710</td>
<td>1</td>
<td>Allison Engineering Company</td>
</tr>
<tr>
<td>DR-980</td>
<td>2</td>
<td>Comet Engineering Company</td>
</tr>
<tr>
<td>VL-2</td>
<td>2</td>
<td>Loening Aeronautical Corporation</td>
</tr>
<tr>
<td>Warner &quot;Scarab&quot;</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Total** 549

### Aircraft Engines Delivered to U. S. Navy in 1930

<table>
<thead>
<tr>
<th>Model</th>
<th>Number Delivered</th>
<th>Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>F4B-2</td>
<td>32</td>
<td>Curtiss Aeroplane &amp; Motor Company</td>
</tr>
<tr>
<td>XF5B-1</td>
<td>1</td>
<td>Boeing Aircraft Company</td>
</tr>
<tr>
<td>XFD-1</td>
<td>1</td>
<td>Boeing Aircraft Company</td>
</tr>
<tr>
<td>XF-1</td>
<td>1</td>
<td>Curtiss Aeroplane &amp; Motor Company</td>
</tr>
<tr>
<td>O-16</td>
<td>30</td>
<td>Atlantic Aircraft Corporation</td>
</tr>
<tr>
<td>O-40U-1</td>
<td>1</td>
<td>Bristol Aeroplane Company</td>
</tr>
<tr>
<td>OL-9</td>
<td>15</td>
<td>Loening Aeronautical Eng. Corporation</td>
</tr>
<tr>
<td>FK-1</td>
<td>18</td>
<td>Chance Vought Corporation</td>
</tr>
<tr>
<td>XP-2S-1</td>
<td>1</td>
<td>Loening Aeronautical Eng. Corporation</td>
</tr>
<tr>
<td>PM-2</td>
<td>25</td>
<td>Sikorsky Aviation Corporation</td>
</tr>
<tr>
<td>PH-1</td>
<td>9</td>
<td>Glenn L. Martin Company</td>
</tr>
<tr>
<td>XP8H-1</td>
<td>1</td>
<td>Hall Aluminum Aircraft Corporation</td>
</tr>
<tr>
<td>T2D-2</td>
<td>1</td>
<td>Hall Aluminum Aircraft Corporation</td>
</tr>
<tr>
<td>XT2D-1</td>
<td>1</td>
<td>Douglas Aircraft Company</td>
</tr>
<tr>
<td>XB-1</td>
<td>1</td>
<td>Douglas Aircraft Company</td>
</tr>
<tr>
<td>NY-3</td>
<td>20</td>
<td>Loening Aeronautical Eng. Corporation</td>
</tr>
<tr>
<td>N2C-2</td>
<td>20</td>
<td>Consolidated Aircraft Corporation</td>
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<tr>
<td>NT-1</td>
<td>6</td>
<td>Curtiss Aeroplane &amp; Motor Company</td>
</tr>
<tr>
<td>N3Y-1</td>
<td>6</td>
<td>New Standard Aircraft Corporation</td>
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<tr>
<td>A8546 Glider</td>
<td>1</td>
<td>American Motorless Aviation Corp.</td>
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<tr>
<td>IR-5</td>
<td>2</td>
<td>Ford Motor Company</td>
</tr>
<tr>
<td>XJD-2</td>
<td>1</td>
<td>Fairchild Aviation Corporation</td>
</tr>
</tbody>
</table>

**Total** 287
APPENDIX

NATIONAL BALLOON RACE
Bellaire Field, Houston, Texas, July 4, 1930

Official Standing of Contestants

<table>
<thead>
<tr>
<th>Place</th>
<th>Entry</th>
<th>Pilot and Aide</th>
<th>Place of landing</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Detroit Balloon Club</td>
<td>F. A. Trotter</td>
<td>SW Campbellville, Ky.</td>
<td>768 mi.</td>
</tr>
<tr>
<td>5.</td>
<td>U. S. Navy</td>
<td>George Hineman</td>
<td>NY Adairville, Ky.</td>
<td>685 mi.</td>
</tr>
<tr>
<td>6.</td>
<td>United States</td>
<td>T. G. W. Settle</td>
<td>NE Olmstead, Ky.</td>
<td>685 mi.</td>
</tr>
<tr>
<td>11.</td>
<td>Dr. George M. LeGallee</td>
<td>K. S. Axtater</td>
<td>Miami, Fla.</td>
<td>325 mi.</td>
</tr>
<tr>
<td>12.</td>
<td>Detroit Balloon Club</td>
<td>R. E. Holmes</td>
<td>Miami, Fla.</td>
<td>325 mi.</td>
</tr>
<tr>
<td></td>
<td>mercial</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GORDON BENNETT BALLOON RACE
Cleveland, Ohio, September 1, 1930
Cleveland Airport

Official Standing of Contestants

<table>
<thead>
<tr>
<th>Place</th>
<th>Entry</th>
<th>Pilot and Aide</th>
<th>Place of landing</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>United States</td>
<td>E. Coeckelberg</td>
<td>Farm</td>
<td>348 mi.</td>
</tr>
<tr>
<td>5.</td>
<td>Germany</td>
<td>F. J. Hill</td>
<td>Copenhagan, N. Y., 1½ miles S</td>
<td>348 mi.</td>
</tr>
</tbody>
</table>

GORDON BENNETT BALLOON RACE
Cleveland, Ohio, September 1, 1930
Cleveland Airport

Official Standing of Contestants

<table>
<thead>
<tr>
<th>Place</th>
<th>Entry</th>
<th>Pilot and Aide</th>
<th>Place of landing</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>United States</td>
<td>E. Coeckelberg</td>
<td>Farm</td>
<td>348 mi.</td>
</tr>
<tr>
<td>5.</td>
<td>Germany</td>
<td>F. J. Hill</td>
<td>Copenhagan, N. Y., 1½ miles S</td>
<td>348 mi.</td>
</tr>
<tr>
<td>Place</td>
<td>Plane</td>
<td>A.T.C. No.</td>
<td>Motor Used</td>
<td>No. of Engines</td>
</tr>
<tr>
<td>-------</td>
<td>-----------</td>
<td>------------</td>
<td>------------</td>
<td>----------------</td>
</tr>
<tr>
<td>1st</td>
<td>Ford</td>
<td>246</td>
<td>{2 Wrights 1 Wasp}</td>
<td>3</td>
</tr>
<tr>
<td>2nd</td>
<td>Waco</td>
<td>362</td>
<td>Wright</td>
<td>1</td>
</tr>
<tr>
<td>3rd</td>
<td>Waco</td>
<td>362</td>
<td>Wright</td>
<td>1</td>
</tr>
<tr>
<td>4th</td>
<td>Ford</td>
<td>165</td>
<td>Wright</td>
<td>1</td>
</tr>
<tr>
<td>5th</td>
<td>Bellanca</td>
<td>245</td>
<td>Wright</td>
<td>1</td>
</tr>
<tr>
<td>6th</td>
<td>Curtiss Kingbird</td>
<td>348</td>
<td>Wrights</td>
<td>2</td>
</tr>
<tr>
<td>7th</td>
<td>Bellanca</td>
<td>129</td>
<td>Wright</td>
<td>1</td>
</tr>
<tr>
<td>8th</td>
<td>Cessna</td>
<td>72</td>
<td>Warner</td>
<td>1</td>
</tr>
<tr>
<td>9th</td>
<td>Travel Air</td>
<td>352</td>
<td>Wright</td>
<td>1</td>
</tr>
<tr>
<td>10th</td>
<td>Waco</td>
<td>345</td>
<td>Kinmer</td>
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</tr>
<tr>
<td>11th</td>
<td>Ken Royce</td>
<td>314</td>
<td>Continental</td>
<td>1</td>
</tr>
<tr>
<td>12th</td>
<td>Monocoupe</td>
<td>306</td>
<td>Lambert</td>
<td>1</td>
</tr>
<tr>
<td>13th</td>
<td>American Eagle</td>
<td>302</td>
<td>Continental</td>
<td>1</td>
</tr>
<tr>
<td>14th</td>
<td>Kitty Hawk</td>
<td>166</td>
<td>Kinmer</td>
<td>1</td>
</tr>
<tr>
<td>15th</td>
<td>Cabinaire</td>
<td>205</td>
<td>Wright</td>
<td>1</td>
</tr>
<tr>
<td>16th</td>
<td>Great Lakes</td>
<td>354</td>
<td>Cirrus</td>
<td>1</td>
</tr>
<tr>
<td>17th</td>
<td>Mercury</td>
<td>235</td>
<td>LeBlond</td>
<td>1</td>
</tr>
<tr>
<td>18th</td>
<td>Sikorsky</td>
<td>340</td>
<td>Wasp, Jr</td>
<td>1</td>
</tr>
</tbody>
</table>
## 1930 NATIONAL AIR RACES

**August 23rd—September 1st**

**Curtiss-Reynolds Airport, Chicago, Illinois**

### WOMEN'S CLASS "A" PACIFIC DERBY—LONG BEACH, CALIF., TO CHICAGO, ILL.

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Gladys O'Donnell</td>
<td>Waco</td>
<td>J-6.7</td>
<td>15:13.16</td>
<td>$3,500.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Mildred Morgan</td>
<td>Travel Air</td>
<td>J-5</td>
<td>21:08.35</td>
<td>2,100.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Jean LaKene</td>
<td>Am. Eagle</td>
<td>J-6.7</td>
<td>21:15.49</td>
<td>1,400.00</td>
</tr>
<tr>
<td>4th</td>
<td>Ruth M. Stewart</td>
<td>Robin</td>
<td>Chall.</td>
<td>26:38.06</td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td>Ruth W. Barron</td>
<td>Buhl</td>
<td>J-5</td>
<td>38:33.41</td>
<td></td>
</tr>
</tbody>
</table>

### WOMEN'S CLASS "B" DIXIE DERBY—WASHINGTON, D. C., TO CHICAGO, ILL.

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Phoebe F. Omile</td>
<td>Monocoupe</td>
<td>Warner</td>
<td>11:42.21</td>
<td>$2,000.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Martie Bowman</td>
<td>Fleet</td>
<td>Kinner</td>
<td>14:28.39</td>
<td>1,200.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Laura Ingalls</td>
<td>DH Moth</td>
<td>Gypsy</td>
<td>16:47.26</td>
<td>800.00</td>
</tr>
<tr>
<td>4th</td>
<td>Nancy Hopkins</td>
<td>Kitty Hawk</td>
<td>Kinner</td>
<td>19:18.18</td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td>Charity Langdon</td>
<td>Whist. Avian</td>
<td>Cirrus</td>
<td>20:44.47</td>
<td></td>
</tr>
</tbody>
</table>

### MEN'S CLASS "A" ATLANTIC DERBY—MIAMI, FLA., TO CHICAGO, ILL.

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>A. W. Killips</td>
<td>Waco</td>
<td>J-6.7</td>
<td>11:53.23</td>
<td>$1,750.00</td>
</tr>
<tr>
<td>2nd</td>
<td>A. J. Davis</td>
<td>Waco</td>
<td>J-6.7</td>
<td>11:59.49</td>
<td>1,050.00</td>
</tr>
<tr>
<td>3rd</td>
<td>C. E. Burrell</td>
<td>Stearman</td>
<td></td>
<td>14:59.07.0</td>
<td>760.00</td>
</tr>
</tbody>
</table>

### MEN'S CLASS "B" ATLANTIC DERBY—HARTFORD, CONN., TO CHICAGO, ILL.

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>J. Wesley Smith</td>
<td>Monocoupe</td>
<td>Warner</td>
<td>8:24.37.1</td>
<td>$1,250.00</td>
</tr>
<tr>
<td>2nd</td>
<td>H. A. Little, Jr.</td>
<td>Monoport</td>
<td>Warner</td>
<td>8:29.29.6</td>
<td>750.00</td>
</tr>
<tr>
<td>3rd</td>
<td>C. W. Meyers</td>
<td>Great Lakes</td>
<td>Cirrus</td>
<td>9:04.58.1</td>
<td>500.00</td>
</tr>
<tr>
<td>4th</td>
<td>Leslie Bowman</td>
<td>Monoport</td>
<td>Kinner</td>
<td>9:28.34.2</td>
<td></td>
</tr>
</tbody>
</table>

### MEN'S CLASS "A" PACIFIC DERBY—SEATTLE, WASH., TO CHICAGO, ILL.

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>John Blum</td>
<td>Lockheed</td>
<td>J-5</td>
<td>18:24.31.1</td>
<td>$3,500.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Nick Mamer</td>
<td>Stearman</td>
<td>J-5</td>
<td>18:47.46.4</td>
<td>2,100.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Frank Rammer</td>
<td>Ryan</td>
<td>J-5</td>
<td>19:37.01.9</td>
<td>1,400.00</td>
</tr>
<tr>
<td>4th</td>
<td>Bert Rouff</td>
<td>Ryan</td>
<td>J-5</td>
<td>20:44.50.7</td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td>Floyd Keadle</td>
<td>Waco</td>
<td>J-5</td>
<td>23:08.12</td>
<td></td>
</tr>
</tbody>
</table>
### MEN'S CLASS "B" PACIFIC DERBY—BROWNSVILLE, TEXAS, TO CHICAGO, ILL.

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>John H. Livingston</td>
<td>Monocoupé</td>
<td>Warner</td>
<td>16:10:29</td>
<td>$2,000.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Wilfred G. Moore</td>
<td>Inland Spt.</td>
<td>Warner</td>
<td>17:28:52.7</td>
<td>1,200.00</td>
</tr>
</tbody>
</table>

### MEN'S NONSTOP DERBY—LOS ANGELES, CALIF, TO CHICAGO, ILL.

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Wiley Post</td>
<td>Lockheed</td>
<td>Wasp</td>
<td>9:09:04</td>
<td>$7,500.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Arthur Goebel</td>
<td>Lockheed</td>
<td>Wasp</td>
<td>9:21:24.4</td>
<td>4,500.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Lee Shoemair</td>
<td>Lockheed</td>
<td>Wasp</td>
<td>9:39:17</td>
<td></td>
</tr>
<tr>
<td>4th</td>
<td>William S. Brock</td>
<td>Lockheed</td>
<td>Wasp</td>
<td>9:33:57</td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td>Roscoe Turner</td>
<td>Lockheed</td>
<td>Ex. Hornet</td>
<td>9:38:41</td>
<td></td>
</tr>
</tbody>
</table>

### EVENT NO. 1—WOMEN'S 500 CU. IN.—OPEN SHIPS—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Phoebe F. Omles</td>
<td>Inland Spt</td>
<td>Warner</td>
<td>13:05:27</td>
<td>$500.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Martie Bowman</td>
<td>Monosport</td>
<td>Warner</td>
<td>13:11:06</td>
<td>300.00</td>
</tr>
</tbody>
</table>

### EVENT NO. 2—WOMEN'S 500 CU. IN.—CABIN SHIPS—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>E. B. Heath</td>
<td>Bristol</td>
<td>Heath</td>
<td>18:57:1</td>
<td>$375.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Delbert Koerner</td>
<td>White Aero-Speed</td>
<td>Heath</td>
<td>20:44:6</td>
<td>225.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Gus Palmquist</td>
<td>Midwing</td>
<td>Bristol</td>
<td>21:38:4</td>
<td>150.00</td>
</tr>
<tr>
<td>4th</td>
<td>M. Lambert</td>
<td>Monocoupé</td>
<td>Warner</td>
<td>Did not finish</td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td>Guy Menacezy</td>
<td>Boeing Ftr.</td>
<td></td>
<td>Disqualified</td>
<td></td>
</tr>
</tbody>
</table>

### EVENT NO. 3—MEN'S 110 CU. IN. FREE FOR ALL—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Lt. Sanderson</td>
<td>Boeing Ftr.</td>
<td></td>
<td>16:10:29</td>
<td>$375.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Lt. Burchard</td>
<td>Boeing Ftr.</td>
<td></td>
<td>17:28:52.7</td>
<td>1,200.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Lt. Kerr</td>
<td>Boeing Ftr.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th</td>
<td>Sgt. Shepard</td>
<td>Boeing Ftr.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td>Lt. Cloud</td>
<td>Boeing Ftr.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6th</td>
<td>Lt. Brewster</td>
<td>Boeing Ftr.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EVENT NO. 4—MARINE CORPS CLOSED EVENT—ATTACK PLANES—10 LAPS 5 MILE COURSE
### EVENT NO. 5—MEN'S 275 CU. IN. OPEN SHIPS—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Art. Chester</td>
<td>Davis</td>
<td>LeBlond</td>
<td>12:08:7</td>
<td>$375.00</td>
</tr>
<tr>
<td>2nd</td>
<td>B. W. Diggle</td>
<td>Inland Spt.</td>
<td>LeBlond</td>
<td>12:46:3</td>
<td>225.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Freddie Lund</td>
<td>Davis</td>
<td>LeBlond</td>
<td>13:42:1</td>
<td>150.00</td>
</tr>
</tbody>
</table>

### EVENT NO. 6—MEN'S 275 CU. IN. CABIN SHIPS—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Bart. Stevenson</td>
<td>Monocoupe</td>
<td>Lambert</td>
<td>12:46:2</td>
<td>$375.00</td>
</tr>
<tr>
<td>2nd</td>
<td>C. B. Burmood</td>
<td>Monocoupe</td>
<td>Lambert</td>
<td>12:08:7</td>
<td>225.00</td>
</tr>
<tr>
<td>3rd</td>
<td>J. H. Livingston</td>
<td>Monocoupe</td>
<td>Lambert</td>
<td>13:39:9</td>
<td>150.00</td>
</tr>
</tbody>
</table>

### EVENT NO. 7—MEN'S 275 CU. IN. FREE FOR ALL—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>E. B. Heath</td>
<td>Cannon Ball</td>
<td>Heath</td>
<td>12:43:4</td>
<td>$375.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Bart. Stevenson</td>
<td>Monocoupe</td>
<td>Lambert</td>
<td>12:57:9</td>
<td>225.00</td>
</tr>
<tr>
<td>3rd</td>
<td>D. A. Fowlie</td>
<td>Phantom</td>
<td>Pobjoy</td>
<td>13:01:10</td>
<td>150.00</td>
</tr>
<tr>
<td>5th</td>
<td>C. B. Burmood</td>
<td>Monocoupe</td>
<td>LeBlond</td>
<td>13:42:4</td>
<td></td>
</tr>
</tbody>
</table>

### EVENT NO. 10—MEN'S OPEN OX5 RACE—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Art. Chester</td>
<td>Travel Air</td>
<td>Curtiss</td>
<td>$300.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Herman Hamer</td>
<td>Travel Air</td>
<td>Curtiss</td>
<td>300.00</td>
</tr>
<tr>
<td>3rd</td>
<td>S. J. Wittman</td>
<td>Pheasant</td>
<td>Curtiss</td>
<td>200.00</td>
</tr>
</tbody>
</table>

### EVENT NO. 11—MEN'S CABIN OX5 RACE—CANCELLLED FOR LACK OF ENTRIES

### EVENT NO. 12—MEN'S 350 CU. IN.—OPEN SHIPS—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Charles Meyers</td>
<td>Ct. Lakes</td>
<td>Curtiss</td>
<td>12:40:7</td>
<td>$300.00</td>
</tr>
<tr>
<td>2nd</td>
<td>W. S. Green</td>
<td>Inland Spt.</td>
<td>Cirrus</td>
<td>13:34:0</td>
<td>300.00</td>
</tr>
<tr>
<td>3rd</td>
<td>B. W. Diggle</td>
<td>Inland Spt.</td>
<td>LeBlond</td>
<td>14:00:3</td>
<td>200.00</td>
</tr>
<tr>
<td>4th</td>
<td>P. G. Sparks</td>
<td>Inland Spt.</td>
<td>LeBlond</td>
<td>14:13:4</td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td>H. S. Darr</td>
<td>Mercury</td>
<td>LeBlond</td>
<td>14:29:3</td>
<td></td>
</tr>
</tbody>
</table>

### EVENT NO. 13—MEN'S 350 CU. IN. CABIN RACE—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Vern Roberts</td>
<td>Monocoupe</td>
<td>Lambert</td>
<td>12:25:2</td>
<td>$300.00</td>
</tr>
<tr>
<td>2nd</td>
<td>F. G. Sparks</td>
<td>Inland Spt.</td>
<td>D. H. Pues</td>
<td>12:30:4</td>
<td>300.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Bart Stevenson</td>
<td>Monocoupe</td>
<td>Lambert</td>
<td>12:55:3</td>
<td>200.00</td>
</tr>
</tbody>
</table>
### EVENT NO. 14—MEN'S FREE FOR ALL—350 CU. IN.—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Ben O. Howard</td>
<td>Howard</td>
<td>Gypsy</td>
<td>9:12:1</td>
<td>$500.00</td>
</tr>
<tr>
<td>2nd</td>
<td>E. Y. Newson</td>
<td>Commandaire</td>
<td>Cirrus</td>
<td>9:15:2:7</td>
<td>300.00</td>
</tr>
<tr>
<td>3rd</td>
<td>R. Wedell</td>
<td>Wedell Wms.</td>
<td>Cirrus</td>
<td>10:14:5</td>
<td>200.00</td>
</tr>
<tr>
<td>4th</td>
<td>Willard van King.</td>
<td>Laird</td>
<td>Cirrus</td>
<td>10:15:4:2</td>
<td>100.00</td>
</tr>
<tr>
<td>5th</td>
<td>Herman Hamer</td>
<td>Laird</td>
<td>Cirrus</td>
<td>10:15:4:2</td>
<td>100.00</td>
</tr>
<tr>
<td>6th</td>
<td>F. G. Sparks</td>
<td>Puss Moth</td>
<td>Gypsy</td>
<td>12:13</td>
<td></td>
</tr>
</tbody>
</table>

### EVENT NO. 15—MEN'S 450 CU. IN.—OPEN SHIPS—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>W. G. Moore</td>
<td>Inland Spt.</td>
<td>Warner</td>
<td>11:38</td>
<td>$500.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Les. Bowman</td>
<td>Waco F.</td>
<td>Kinmer</td>
<td>12:35</td>
<td>300.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Chas. W. Meyers.</td>
<td>Great Lakes</td>
<td>Cirrus</td>
<td>12:37</td>
<td>200.00</td>
</tr>
<tr>
<td>4th</td>
<td>Wm. A. Ong.</td>
<td>Inland Spt.</td>
<td>Warner</td>
<td>12:55:1</td>
<td>100.00</td>
</tr>
<tr>
<td>5th</td>
<td>Wm. Green.</td>
<td>Inland Spt.</td>
<td>Warner</td>
<td>12:37:1</td>
<td>100.00</td>
</tr>
</tbody>
</table>

### EVENT NO. 16—MEN'S 450 CU. IN.—CABIN RACE—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Vern Roberts.</td>
<td>Monocoupe</td>
<td>Warner</td>
<td>10:15:0</td>
<td>$500.00</td>
</tr>
<tr>
<td>2nd</td>
<td>J. T. Livingston.</td>
<td>Monocoupe</td>
<td>Warner</td>
<td>10:16</td>
<td>300.00</td>
</tr>
<tr>
<td>4th</td>
<td>J. Wesley Smith.</td>
<td>Monocoupe</td>
<td>Warner</td>
<td>11:28:7</td>
<td>100.00</td>
</tr>
</tbody>
</table>

### EVENT NO. 17—MEN'S 450 CU. IN. FREE FOR ALL—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Ben O. Howard</td>
<td>Howard</td>
<td>Gypsy</td>
<td>9:41:3</td>
<td>$500.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Wm. O. Ong.</td>
<td>Cessna</td>
<td>Warner</td>
<td>10:15:6</td>
<td>300.00</td>
</tr>
<tr>
<td>3rd</td>
<td>E. Y. Newson</td>
<td>Commandaire</td>
<td>Cirrus</td>
<td>10:22:0</td>
<td>200.00</td>
</tr>
<tr>
<td>4th</td>
<td>R. T. Quimby.</td>
<td>Monocoupe</td>
<td>Warner</td>
<td>11:36:2</td>
<td>100.00</td>
</tr>
<tr>
<td>6th</td>
<td>Willard van King.</td>
<td>Aristocrat</td>
<td>Cirrus</td>
<td>11:24:2</td>
<td>100.00</td>
</tr>
</tbody>
</table>

### EVENT NO. 18—MEN'S 650 CU. IN.—OPEN SHIPS—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Wm. A. Ong.</td>
<td>Inland Spt.</td>
<td>Warner</td>
<td>11:33:3</td>
<td>$600.00</td>
</tr>
<tr>
<td>3rd</td>
<td>J. B. Story</td>
<td>Cessna</td>
<td>Kinmer</td>
<td>12:38:7</td>
<td>210.00</td>
</tr>
</tbody>
</table>

### EVENT NO. 19—MEN'S 650 CU. IN.—OPEN SHIPS—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Vern Roberts.</td>
<td>Monocoupe</td>
<td>Warner</td>
<td>10:34:2</td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td>Les. Bowman</td>
<td>Monocoupe</td>
<td>Kinmer</td>
<td>10:41:8</td>
<td>356:30</td>
</tr>
</tbody>
</table>
### EVENT NO. 20—MEN'S FREE FOR ALL—650 CU. IN.—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Ben O. Howard</td>
<td>Howard</td>
<td>Gypsy</td>
<td>19:19</td>
<td>$500.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Wm. A. Ong.</td>
<td>Cessna</td>
<td>Warner</td>
<td>20:17</td>
<td>$300.00</td>
</tr>
<tr>
<td>3rd</td>
<td>E. Z. Newcom</td>
<td>Commandair</td>
<td>Monosport</td>
<td>20:53</td>
<td>$240.00</td>
</tr>
<tr>
<td>4th</td>
<td>R. T. Quimby</td>
<td>Monosport</td>
<td>Cirrus</td>
<td>21:09</td>
<td>$100.00</td>
</tr>
</tbody>
</table>

### EVENT NO. 21—NATIONAL GUARD RACE—LIBERTY ENGINE BUILDERS TROPHY

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Wm. Wilson V. Newhall</td>
<td>Douglas</td>
<td>O 211</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td>C. Barnhill</td>
<td>Douglas</td>
<td>Liberty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td>Phil Love</td>
<td>Douglas</td>
<td>Liberty</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EVENT NO. 22—MEN'S 800 CU. IN.—OPEN SHIPS—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Lloyd O'Donnell</td>
<td>Waco 10</td>
<td>J-6-2</td>
<td>0:32.9</td>
<td>$750.00</td>
</tr>
<tr>
<td>2nd</td>
<td>A. J. Davis</td>
<td>Waco 10</td>
<td>J-6-7</td>
<td>10:19</td>
<td>$150.00</td>
</tr>
<tr>
<td>3rd</td>
<td>A. W. Killips</td>
<td>Waco 10</td>
<td>J-5</td>
<td>10:27</td>
<td>$150.00</td>
</tr>
<tr>
<td>4th</td>
<td>M. E. Greveenberg</td>
<td>Pitsaiera</td>
<td>J-5</td>
<td>10:38</td>
<td>$150.00</td>
</tr>
<tr>
<td>5th</td>
<td>Freddie Lund</td>
<td>Waco</td>
<td>J-6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EVENT NO. 23—MEN'S 800 CU. IN. CABIN RACE—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Vern Roberts</td>
<td>Monosport</td>
<td>Warner</td>
<td>10:18.5</td>
<td>$750.00</td>
</tr>
<tr>
<td>2nd</td>
<td>John H. Livingston</td>
<td>Monosport</td>
<td>Warner</td>
<td>10:19.0</td>
<td>300.00</td>
</tr>
<tr>
<td>3rd</td>
<td>R. T. Quimby</td>
<td>Monosport</td>
<td>Warner</td>
<td>10:42.8</td>
<td>300.00</td>
</tr>
<tr>
<td>4th</td>
<td>J. H. Bridges</td>
<td>Cessna</td>
<td>J-6-7</td>
<td>10:59</td>
<td>300.00</td>
</tr>
<tr>
<td>5th</td>
<td>Casey Jones</td>
<td>Cessna</td>
<td>W. Whirl</td>
<td>11:07</td>
<td></td>
</tr>
</tbody>
</table>

### EVENT NO. 24—MEN'S FREE FOR ALL—800 CU. IN.—5 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Ben O. Howard</td>
<td>Howard</td>
<td>Gypsy</td>
<td>9:14.1</td>
<td>$750.00</td>
</tr>
<tr>
<td>2nd</td>
<td>E. V. Stewart</td>
<td>Cessna</td>
<td>Warner</td>
<td>9:17</td>
<td>450.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Wm. A. Ong.</td>
<td>Cessna</td>
<td>Warner</td>
<td>10:17.1</td>
<td>300.00</td>
</tr>
<tr>
<td>4th</td>
<td>Jas. A. McCready</td>
<td>Menasco</td>
<td>Warner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td>E. M. Larell</td>
<td>Speedwing</td>
<td>Wright</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6th</td>
<td>Casey Jones</td>
<td>Cessna</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EVENT NO. 25—PARACHUTE JUMPING CONTEST

**August 24, 1930**

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>R. D. Rae</td>
<td>$100.00</td>
</tr>
<tr>
<td>2nd</td>
<td>E. V. Stewart</td>
<td>60.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Joe Crane</td>
<td>40.00</td>
</tr>
</tbody>
</table>

APPENDIX
August 25, 1930

Place       Pilot
1st.        Ralph LaPere.
2nd.        Joe Crane.
3rd.        R. D. Rae.

Cash Prize
$100.00
60.00
40.00

August 26, 1930

1st.        R. D. Rae.
2nd.        Enrique Miles.
3rd.        Joe Crane.
4th.        D. V. Stewart.

Cash Prize
$100.00
60.00
40.00

August 27, 1930

1st.        R. D. Rae.
2nd.        Joe Crane.
3rd.        J. Runger.

Cash Prize
$100.00
60.00
40.00

August 28, 1930

1st.        E. V. Stewart.
2nd.        Joe Crane.
3rd.        Ralph LaPere.

Cash Prize
$100.00
60.00
40.00

August 29, 1930

1st.        Joe Crane.
2nd.        R. D. Rae.
3rd.        Enrique Miles.

Cash Prize
$100.00
60.00
40.00

August 30, 1930

1st.        R. D. Rae.
2nd.        Joe Crane.
3rd.        Enrique Miles.

Cash Prize
$100.00
60.00
40.00

August 31st, 1930

1st.        R. D. Rae.
2nd.        E. V. Stewart.
3rd.        Enrique Miles.

Cash Prize
$100.00
60.00
40.00

September 1, 1930

1st.        R. D. Rae.
2nd.        Ralph LaPere.
3rd.        Joe Crane.

Cash Prize
$100.00
60.00
40.00

EVENT NO. 26—MEN'S 2,000 CU. IN.—OPEN SHIPS—6 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st.</td>
<td>James Haislip</td>
<td>Travel Air</td>
<td>T-6-9</td>
<td>9:49</td>
<td>$1,000.00</td>
</tr>
<tr>
<td>2nd.</td>
<td>Chas. Holman</td>
<td>Laird</td>
<td>T-6-9</td>
<td>9:53:26</td>
<td>600.00</td>
</tr>
<tr>
<td>3rd.</td>
<td>Ben O. Howard</td>
<td>Howard</td>
<td>W. Gypsy</td>
<td>11:17:4</td>
<td>400.00</td>
</tr>
<tr>
<td>4th.</td>
<td>Brett Williams</td>
<td>Wedell Wms.</td>
<td>J-6-7</td>
<td>11:58:1</td>
<td></td>
</tr>
</tbody>
</table>
EVENT NO. 27—MEN'S 1,000 CU. IN.—CABIN RACE—10 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Casey Jones</td>
<td>Cessna</td>
<td>Wright</td>
<td>20:11.7</td>
<td>$1,000.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Geo. L. Harte</td>
<td>Cessna</td>
<td>Wright 300</td>
<td>20:13.3</td>
<td>600.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Geo. W. Haldeman</td>
<td>Bellanca</td>
<td>Wright J-6-7</td>
<td>22:22.6</td>
<td>400.00</td>
</tr>
</tbody>
</table>

EVENT NO. 28—MEN'S FREE FOR ALL—1,000 CU. IN.—10 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Ben O. Howard</td>
<td>Howard</td>
<td>Gypsy</td>
<td></td>
<td>$1,000.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Brett Williams</td>
<td>Wedell Wms</td>
<td>J-6-7</td>
<td></td>
<td>600.00</td>
</tr>
<tr>
<td>3rd</td>
<td>G. L. Harte</td>
<td>Cessna</td>
<td>W 300</td>
<td></td>
<td>400.00</td>
</tr>
<tr>
<td>4th</td>
<td>Earl B. Smith</td>
<td>Cessna</td>
<td>Cirrus</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

EVENT NO. 29—AIR TRANSPORT & EFFICIENCY RACE—10 LAPS 5 MILE COURSE

For Speed

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Speed</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>James Haizlip</td>
<td>Lockheed V</td>
<td>Wasp</td>
<td>18:38.7</td>
<td>160.69</td>
<td>$450.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Harold Young</td>
<td>Pacemaker</td>
<td>J-6</td>
<td>23:09</td>
<td>129.59</td>
<td>300.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Geo. Haldeman</td>
<td>Airbus</td>
<td>Conq.</td>
<td>24:13.7</td>
<td>123.82</td>
<td>180.00</td>
</tr>
<tr>
<td>4th</td>
<td>Stewart Chadwick</td>
<td>Bellanca</td>
<td>J-5</td>
<td>27:38.4</td>
<td>108.54</td>
<td></td>
</tr>
</tbody>
</table>

For Efficiency

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Cu. In.</th>
<th>Lbs.</th>
<th>Speed</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Harold Young</td>
<td>Pacemaker</td>
<td>J-6</td>
<td>975</td>
<td>1,376</td>
<td>666.92</td>
<td>$450.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Geo. Haldeman</td>
<td>Airbus</td>
<td>Conq.</td>
<td>1,550</td>
<td>1,142</td>
<td>471.59</td>
<td>270.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Stewart Chadwick</td>
<td>Bellanca</td>
<td>Lockheed V</td>
<td>1,344</td>
<td>1,009</td>
<td>350.14</td>
<td></td>
</tr>
<tr>
<td>4th</td>
<td>James Haizlip</td>
<td>Lockheed V</td>
<td>Wasp</td>
<td></td>
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</tbody>
</table>

EVENT NO. 30—MEN'S OPEN OR CABIN MULTI-MOTORED RACE—10 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Leroy Manning</td>
<td>Ford</td>
<td>Wasp</td>
<td>20:47.9</td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td>W. J. Fleming</td>
<td>Bach</td>
<td>Horse</td>
<td>21:49.7</td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td>Frank Kern</td>
<td>Kingbird</td>
<td>Wr. Whirl</td>
<td>At 4th lap</td>
<td></td>
</tr>
</tbody>
</table>

EVENT NO. 31—U. S. NAVY RACE—10 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Lt. D. S. Cornwell</td>
<td>Boeing</td>
<td>P &amp; W Wasp</td>
<td>23:34.8</td>
<td>Trophy</td>
</tr>
<tr>
<td>3rd</td>
<td>Lt. J. P. DeShazo</td>
<td>Boeing</td>
<td>P &amp; W Wasp</td>
<td>23:35.9</td>
<td></td>
</tr>
</tbody>
</table>
### EVENT NO. 32—MEN'S FREE FOR ALL—THOMPSON TROPHY RACE—20 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Chas. Holman</td>
<td>Laird</td>
<td>P &amp; W</td>
<td>29:43.0</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>2nd</td>
<td>James Haizlip</td>
<td>Travel Air</td>
<td>W-9</td>
<td>30:01.8</td>
<td>3,000.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Ben O. Howard</td>
<td>Howard</td>
<td>Gypsy</td>
<td>36:57.3</td>
<td>2,000.00</td>
</tr>
<tr>
<td>4th</td>
<td>Paul T. Adams</td>
<td>Travel Air</td>
<td>W-9</td>
<td>32:03.8</td>
<td>2,000.00</td>
</tr>
<tr>
<td>5th</td>
<td>Brett Williams</td>
<td>Cessna</td>
<td>Curtiss</td>
<td>Crashed at 13th Lap.</td>
<td></td>
</tr>
<tr>
<td>6th</td>
<td>Arthur H. Page</td>
<td>Curtiss-Hawk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7th</td>
<td>Frank Hawks</td>
<td>Travelair</td>
<td>WW Sped.</td>
<td>Landed at 11th Lap.</td>
<td></td>
</tr>
</tbody>
</table>

### EVENT NO. 32-A—WOMEN'S FREE FOR ALL—MRS. R. McCORMICK TROPHY—10 LAPS 5 MILE COURSE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Gladys O'Donnell</td>
<td>Waco</td>
<td>J-5</td>
<td>20:09.8</td>
<td>$1,250.00</td>
</tr>
<tr>
<td>2nd</td>
<td>May Haizlip</td>
<td>Cessna</td>
<td>Warner</td>
<td>20:12.8</td>
<td>750.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Opal Kunz</td>
<td>Travel Air</td>
<td>W 300</td>
<td>20:34.9</td>
<td>500.00</td>
</tr>
<tr>
<td>4th</td>
<td>Margery Doug</td>
<td>Pitcairn</td>
<td>J-6-7</td>
<td>21:32.5</td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td>Phoebe Onlie</td>
<td>Monocoupe</td>
<td>Warner</td>
<td>22:17.6</td>
<td></td>
</tr>
<tr>
<td>6th</td>
<td>Ruth Nichols</td>
<td>Laird</td>
<td>Chev</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7th</td>
<td>Mildred Morgan</td>
<td>Travel Air</td>
<td>J-5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EVENT NO. 33—MEN'S DEAD STICK LANDING CONTEST

**August 24th**

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>John H. Livingston</td>
<td>Waco</td>
<td>Warner</td>
<td>$100.00</td>
</tr>
<tr>
<td>2nd</td>
<td>W. W. Krantz</td>
<td>Aeronca</td>
<td>Aeronca</td>
<td>50.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Harold Neumann</td>
<td>Travel Air</td>
<td>Curtiss</td>
<td>25.00</td>
</tr>
</tbody>
</table>

**August 25th**

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>John H. Livingston</td>
<td>Waco F</td>
<td>Warner</td>
<td>$100.00</td>
</tr>
<tr>
<td>2nd</td>
<td>M. M. Ross</td>
<td>DH Moth</td>
<td>Gypsy</td>
<td>50.00</td>
</tr>
<tr>
<td>3rd</td>
<td>R. D. Rae</td>
<td>Challenger</td>
<td>OX5</td>
<td>25.00</td>
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</tbody>
</table>

**August 26th**

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
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<tbody>
<tr>
<td>1st</td>
<td>M. Hersberger</td>
<td>Argo</td>
<td>Hess War.</td>
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<tr>
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<td>Waco F</td>
<td>Warner</td>
<td>50.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Harold Neumann</td>
<td>Travel Air</td>
<td>Curtiss</td>
<td>25.00</td>
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**August 27th**

<table>
<thead>
<tr>
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<th>Plane</th>
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</thead>
<tbody>
<tr>
<td>1st</td>
<td>D. A. Fowlie</td>
<td>Travel Air</td>
<td>OX</td>
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</tr>
<tr>
<td>2nd</td>
<td>W. W. Krantz</td>
<td>Aeronca</td>
<td>Aeronca</td>
<td>50.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Art. Davis</td>
<td>Waco</td>
<td>J-6</td>
<td>25.00</td>
</tr>
</tbody>
</table>
August 28th

<table>
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<th>Pilot</th>
<th>Plane</th>
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<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>R. E. Kuser</td>
<td>Waco</td>
<td>OX</td>
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</tr>
<tr>
<td>2nd</td>
<td>Basil Sims</td>
<td>Waco</td>
<td>OX</td>
<td>50.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Lee Brusse</td>
<td>Fleet</td>
<td>Kinner</td>
<td>25.00</td>
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August 29th

<table>
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<td>OX</td>
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<tr>
<td>2nd</td>
<td>E. B. Heath</td>
<td>Parasol</td>
<td>Heath</td>
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</tr>
<tr>
<td>3rd</td>
<td>John H. Livingston</td>
<td>Waco</td>
<td>Warner</td>
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August 30th

<table>
<thead>
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<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Art Davis</td>
<td>Waco</td>
<td>J-6</td>
<td>$100.00</td>
</tr>
<tr>
<td>2nd</td>
<td>W. W. Krantz</td>
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</tr>
<tr>
<td>3rd</td>
<td>Basil Sims</td>
<td>Waco</td>
<td>OX</td>
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August 31st

<table>
<thead>
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<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>W. A. Krantz</td>
<td>Aeronca</td>
<td>Aeronca</td>
<td>$100.00</td>
</tr>
<tr>
<td>2nd</td>
<td>J. H. Livingston</td>
<td>Waco</td>
<td>Warner</td>
<td>50.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Art. Davis</td>
<td>Waco</td>
<td></td>
<td>25.00</td>
</tr>
<tr>
<td>4th</td>
<td>Harold Neumann</td>
<td>Travel Air</td>
<td>OX</td>
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September 1st

<table>
<thead>
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<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Don Rae</td>
<td>Challenger</td>
<td>OX4</td>
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<tr>
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<td>W. W. Krantz</td>
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<tr>
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<td>J. H. Livingston</td>
<td>Waco F.</td>
<td>Warner</td>
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**EVENT NO. 34—WOMEN'S 800 CU. IN.—OPEN SHIPS—5 LAPS 5 MILE COURSE**

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Gladys O’Donnell</td>
<td>Waco</td>
<td>J-6</td>
<td>10:45.4</td>
<td>$750.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Margery Doig</td>
<td>Pikeair</td>
<td>J-6</td>
<td>11:05.4</td>
<td>450.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Mildred Morgan</td>
<td>Travel Air</td>
<td>J-5</td>
<td>13:59.2</td>
<td>300.00</td>
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</tbody>
</table>

**EVENT NO. 35—WOMEN'S 800 CU. IN.—CABIN SHIPS—5 LAPS 5 MILE COURSE**

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Phoebe Omlie</td>
<td>Monocoupe</td>
<td>Warner</td>
<td>10:43.6</td>
<td>$750.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Gladye O'Donnell</td>
<td>Monocoupe</td>
<td>Warner</td>
<td>11:08.1</td>
<td>450.00</td>
</tr>
<tr>
<td>3rd</td>
<td>May Haizlip</td>
<td>Cessna</td>
<td>J-6</td>
<td>11:08.1</td>
<td>300.00</td>
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**EVENT NO. 36—WOMEN'S DEAD STICK LANDING CONTEST**

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Charity Langdon</td>
<td>White</td>
<td></td>
<td>$100.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Betty Lund</td>
<td>Aeronca</td>
<td>Aeronca</td>
<td>50.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Nancy Hopkins</td>
<td>Kitty Hawk</td>
<td>Kinner</td>
<td>25.00</td>
</tr>
</tbody>
</table>
August 24th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st.</td>
<td>J. H. Livingston</td>
<td>Waco</td>
<td>Warner</td>
<td>28.1</td>
<td>$50.00</td>
</tr>
<tr>
<td>2nd.</td>
<td>Freddy Lund</td>
<td>Waco</td>
<td>J-5</td>
<td>58.5</td>
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</table>

August 25th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st.</td>
<td>J. H. Livingston</td>
<td>Waco</td>
<td>Warner</td>
<td>28.1</td>
<td>$50.00</td>
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</table>

August 26th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st.</td>
<td>Harold Neumann</td>
<td>Travel Air</td>
<td>OXs</td>
<td>31.1</td>
<td>$50.00</td>
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<tr>
<td>2nd.</td>
<td>Doug Davis</td>
<td>Travel Air</td>
<td>OXs</td>
<td>33.3</td>
<td>$50.00</td>
</tr>
<tr>
<td>3rd.</td>
<td>Art Davis</td>
<td>Waco</td>
<td>J-6</td>
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August 27th

<table>
<thead>
<tr>
<th>Place</th>
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<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st.</td>
<td>Art Chester</td>
<td>Travel Air</td>
<td>Curtiss</td>
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August 28th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
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</thead>
<tbody>
<tr>
<td>1st.</td>
<td>Doug Davis</td>
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<td>OXs</td>
<td>56</td>
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August 29th

<table>
<thead>
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<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Cash Prize</th>
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<tbody>
<tr>
<td>1st.</td>
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EVENT NO. 37—BALLOON BURSTING CONTEST FOR MEN
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<th>Pilot</th>
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<th>Engine</th>
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</thead>
<tbody>
<tr>
<td>1st</td>
<td>Art Davis</td>
<td>Waco</td>
<td>J-6</td>
<td>25.5</td>
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<tr>
<td>2nd</td>
<td>Doug Davis</td>
<td>Travel Air</td>
<td>J-6</td>
<td>29.1</td>
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**August 31st**

<table>
<thead>
<tr>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Cash Prize</th>
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</thead>
<tbody>
<tr>
<td>J. H. Livingston</td>
<td>Waco</td>
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**EVENT NO. 38—CIVILIAN ACROBATIC EXHIBITION**

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<th>Cash Prize</th>
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</thead>
<tbody>
<tr>
<td>Fred Lund</td>
<td>Waco</td>
<td>J-5</td>
<td>$150.00</td>
</tr>
<tr>
<td>Doug Davis</td>
<td>Travel Air</td>
<td>J-6-7</td>
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**August 24th**

<table>
<thead>
<tr>
<th>Pilot</th>
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<th>Engine</th>
<th>Cash Prize</th>
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</thead>
<tbody>
<tr>
<td>Fred Lund</td>
<td>Waco</td>
<td>J-5</td>
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</tr>
<tr>
<td>Doug Davis</td>
<td>Travel Air</td>
<td>J-6-7</td>
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**August 25th**

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<tbody>
<tr>
<td>Fred Lund</td>
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</tr>
<tr>
<td>Doug Davis</td>
<td>Travel Air</td>
<td>J-6-7</td>
<td>150.00</td>
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**August 26th**

<table>
<thead>
<tr>
<th>Pilot</th>
<th>Cash Prize</th>
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</thead>
<tbody>
<tr>
<td>Art Davis</td>
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<tr>
<td>Lowell Bayles</td>
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**August 27th**

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<tr>
<th>Pilot</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Art Davis</td>
<td>$150.00</td>
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<tr>
<td>Lowell Bayles</td>
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**August 28th**

<table>
<thead>
<tr>
<th>Pilot</th>
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</tr>
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<tbody>
<tr>
<td>S. Quimby</td>
<td>$150.00</td>
</tr>
<tr>
<td>Vern Roberts</td>
<td>150.00</td>
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**August 29th**

<table>
<thead>
<tr>
<th>Pilot</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. Quimby</td>
<td>$150.00</td>
</tr>
<tr>
<td>Vern Roberts</td>
<td>150.00</td>
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</table>

**August 30th**

<table>
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<tr>
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<th>Cash Prize</th>
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</thead>
<tbody>
<tr>
<td>Art Killips</td>
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</tr>
<tr>
<td>Fred Lund</td>
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</table>
### August 31st

**Event No. 39—Speed & Efficiency Cabin Race—10 Laps 5 Mile Course**

**For Speed**

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Time</th>
<th>Speed</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Vern Roberts</td>
<td>Monocoupe</td>
<td>Warner</td>
<td>21:01</td>
<td>142.74</td>
<td>$500.00</td>
</tr>
<tr>
<td>2nd</td>
<td>S. Quimby</td>
<td>Monocoupe</td>
<td>Warner</td>
<td>22:49.4</td>
<td>131.41</td>
<td>300.00</td>
</tr>
<tr>
<td>3rd</td>
<td>B. Stevenson</td>
<td>Monocoupe</td>
<td>Lambert</td>
<td>26:22.3</td>
<td>113.79</td>
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**For Efficiency**

<table>
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<tr>
<th>Place</th>
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<th>Plane</th>
<th>Cu. In.</th>
<th>Lbs.</th>
<th>Time</th>
<th>Speed</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Stewart Chadwick</td>
<td>Bellanca</td>
<td>788</td>
<td>1.142</td>
<td>480.25</td>
<td></td>
<td>$500.00</td>
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<tr>
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<td>B. Stevenson</td>
<td>Monocoupe</td>
<td></td>
<td></td>
<td>336.15</td>
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<td>C. B. Burmood</td>
<td>Monocoupe</td>
<td></td>
<td></td>
<td>323.95</td>
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</table>

### September 1st

**Event No. 40—Sportsman Pilot’s Race—350 CU. IN.—Cancelled—No Entries**

**Event No. 41—Sportsman Pilot’s Race—450 CU. IN.—Open Ships—5 Laps 5 Mile Course**

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Motor</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>A. Hardgrave</td>
<td>Inland Spt.</td>
<td>Warner</td>
<td>12:34.7</td>
<td>Trophy</td>
</tr>
<tr>
<td>2nd</td>
<td>W. G. Houston</td>
<td>Inland Spt.</td>
<td>Warner</td>
<td>12:34.9</td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td>M. C. Meigs</td>
<td>Inland Spt.</td>
<td>Warner</td>
<td>14:56.9</td>
<td></td>
</tr>
<tr>
<td>4th</td>
<td>Wm. R. Boyd</td>
<td>Fleet</td>
<td>Warner</td>
<td>15:11.0</td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td>R. A. Carr</td>
<td>Gt. Lakes</td>
<td>Citrus</td>
<td>16:33.4</td>
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</tbody>
</table>

**Event No. 42—Sportsman Pilot’s Race—650 CU. IN.—Open Ships—5 Laps 5 Mile Course**

<table>
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<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd</td>
<td>Hoot Gibson</td>
<td>Swallow</td>
<td>Axelon</td>
<td>13:43.7</td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td>C. B. Burmood</td>
<td>Monocoupe</td>
<td>Lambert</td>
<td>14:28.8</td>
<td></td>
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</tbody>
</table>

**Event No. 43—Sportsman Pilot’s Race—800 CU. IN.—Open Ships—5 Laps 5 Mile Course—Cancelled—Lack of Entries**

**Event No. 44—Sportsman Pilot’s Race—1,000 CU. IN.—Open Ships—Cancelled—No Entries**
EVENT NO. 45—SPORTSMAN PILOT'S RACE—275 CU. IN.—OPEN SHIPS—CANCELLED—NO ENTRIES

CHICAGO-CLEVELAND MIXED DOUBLES RACE—CANCELLED—NO ENTRIES

EVENT NO. 46A—AMPHIBIAN RACE

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Motor</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>A. Caperton</td>
<td>Sikorsky</td>
<td>Wasp</td>
<td>22:01:8</td>
<td>Trophy</td>
</tr>
<tr>
<td>2nd</td>
<td>R. B. Gast</td>
<td>Sikorsky</td>
<td>Wasp</td>
<td>22:32</td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td>A. O. Johnson</td>
<td>Savoia Mar.</td>
<td>Kinney</td>
<td>4:02:34</td>
<td></td>
</tr>
<tr>
<td>4th</td>
<td>Homer Berry</td>
<td>Sikorsky</td>
<td>Wasp</td>
<td></td>
<td>Did not bring dummy in...</td>
</tr>
</tbody>
</table>

GLIDER CONTESTS

Event No. 46—Primary Duration

August 24th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>W. H. Harris</td>
<td>42 3/5 sec</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd</td>
<td>F. C. Ikela</td>
<td>37 4/5  &quot;</td>
<td>12.00</td>
</tr>
<tr>
<td>3rd</td>
<td>A. Ballard Bradley, Jr.</td>
<td>39  &quot;</td>
<td>8.00</td>
</tr>
</tbody>
</table>

August 25th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>W. B. Brunken</td>
<td>50 1/5 sec</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd</td>
<td>E. Fugelstead</td>
<td>37 1/5  &quot;</td>
<td>12.00</td>
</tr>
<tr>
<td>3rd</td>
<td>F. W. Westphal</td>
<td>39  &quot;</td>
<td>8.00</td>
</tr>
</tbody>
</table>

August 26th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>W. B. Brunken</td>
<td>1 M 2/5 sec</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd</td>
<td>E. Fugelstead</td>
<td>40 2/5  &quot;</td>
<td>12.00</td>
</tr>
<tr>
<td>3rd</td>
<td>F. W. Westphal</td>
<td>3  &quot;</td>
<td>8.00</td>
</tr>
</tbody>
</table>

August 27th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>W. B. Brunken</td>
<td>1 M 4 1/5 sec</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd</td>
<td>E. Fugelstead</td>
<td>3  &quot;</td>
<td>12.00</td>
</tr>
<tr>
<td>3rd</td>
<td>F. W. Westphal</td>
<td>3  &quot;</td>
<td>8.00</td>
</tr>
</tbody>
</table>

August 28th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>F. W. Westphal</td>
<td>1 M 21 2/5 sec</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd</td>
<td>W. B. Brunken</td>
<td>1 &quot; 13  &quot;</td>
<td>12.00</td>
</tr>
<tr>
<td>3rd</td>
<td>E. Fugelstead</td>
<td>1 &quot; 13  &quot;</td>
<td>8.00</td>
</tr>
</tbody>
</table>

August 29th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>W. B. Brunken</td>
<td>1 M 58 1/5 sec</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd</td>
<td>E. Fugelstead</td>
<td>7 2/5  &quot;</td>
<td>12.00</td>
</tr>
<tr>
<td>3rd</td>
<td>F. W. Westphal</td>
<td>7 2/5  &quot;</td>
<td>8.00</td>
</tr>
</tbody>
</table>
August 31st

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st.</td>
<td>W. R. Brunken</td>
<td></td>
<td>1 M 24 1/5 cc.</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd.</td>
<td>F. W. Westphal</td>
<td></td>
<td>1 &quot; 24 3/5 &quot;</td>
<td>12.00</td>
</tr>
<tr>
<td>3rd.</td>
<td>E. F. Engstrom</td>
<td></td>
<td>1 &quot; 44/5 &quot;</td>
<td>8.00</td>
</tr>
</tbody>
</table>

September 1st

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st.</td>
<td>F. W. Westphal</td>
<td></td>
<td>1 M 28 2/3 sec.</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd.</td>
<td>W. R. Brunken</td>
<td></td>
<td>1 &quot; 27 &quot;</td>
<td>12.00</td>
</tr>
<tr>
<td>3rd.</td>
<td>E. Fugelstead</td>
<td></td>
<td>1 &quot; 20 5/8 &quot;</td>
<td>8.00</td>
</tr>
</tbody>
</table>

Event No. 47—Secondary Duration

August 26th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st.</td>
<td>Ivan Stoughton</td>
<td>1 M 36 sec.</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd.</td>
<td>E. D. Palmer</td>
<td>1 &quot; 13 &quot;</td>
<td>8.00</td>
</tr>
<tr>
<td>3rd.</td>
<td>E. D. Palmer</td>
<td>1 &quot; 18 1/5 sec.</td>
<td>12.00</td>
</tr>
</tbody>
</table>

August 28th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st.</td>
<td>J. K. O'Meara</td>
<td>2 M 33 sec.</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd.</td>
<td>E. D. Palmer</td>
<td>1 &quot; 32 &quot;</td>
<td>12.00</td>
</tr>
<tr>
<td>3rd.</td>
<td>Ivan Stoughton</td>
<td>1 &quot; 37 &quot;</td>
<td>8.00</td>
</tr>
</tbody>
</table>

August 29th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st.</td>
<td>J. K. O'Meara</td>
<td>1 M 24 3/5 sec.</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd.</td>
<td>E. D. Palmer</td>
<td>1 &quot; 18 4/5 &quot;</td>
<td>12.00</td>
</tr>
<tr>
<td>3rd.</td>
<td>Ivan Stoughton</td>
<td>1 &quot; 16 3/5 &quot;</td>
<td>8.00</td>
</tr>
</tbody>
</table>

Event No. 48—Soaring Duration

August 25th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st.</td>
<td>J. K. O'Meara</td>
<td>1 M 38 sec.</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd.</td>
<td>W. H. Harris</td>
<td>1 &quot; 14 &quot;</td>
<td>12.00</td>
</tr>
<tr>
<td>3rd.</td>
<td>E. D. Palmer</td>
<td>1 &quot; 58 &quot;</td>
<td>8.00</td>
</tr>
</tbody>
</table>

August 26th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Time</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st.</td>
<td>P. C. Skeels</td>
<td>2 M 13 3/5 sec.</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd.</td>
<td>Ivan Stoughton</td>
<td>1 &quot; 54 2/5 &quot;</td>
<td>12.00</td>
</tr>
<tr>
<td>3rd.</td>
<td>W. H. Harris</td>
<td>1 &quot; 41 2/5 &quot;</td>
<td>8.00</td>
</tr>
</tbody>
</table>
### August 27th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>P. C. Skeels</td>
<td></td>
<td>2 M 16 sec.</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd</td>
<td>W. H. Harris</td>
<td></td>
<td>1 &quot; 48 1/3&quot;</td>
<td>$12.00</td>
</tr>
<tr>
<td>3rd</td>
<td>J. K. O'Meara</td>
<td></td>
<td>1 &quot; 42 1/3&quot;</td>
<td>$8.00</td>
</tr>
</tbody>
</table>

### August 28th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Plane</th>
<th>Engine</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>J. K. O'Meara</td>
<td></td>
<td>2 M 53 600</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd</td>
<td>W. H. Harris</td>
<td></td>
<td>2 &quot; 25 &quot;</td>
<td>$12.00</td>
</tr>
<tr>
<td>3rd</td>
<td>P. C. Skeels</td>
<td></td>
<td>2 &quot; 22 &quot;</td>
<td>$8.00</td>
</tr>
</tbody>
</table>

Event No. 49—Secondary Spot Landing

### August 24th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Engine</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>J. K. O'Meara</td>
<td>32 ft.</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Ivan Stoughton</td>
<td>83 &quot; 4 inches</td>
<td>$12.00</td>
</tr>
<tr>
<td>3rd</td>
<td>E. D. Palmer</td>
<td>189 &quot;</td>
<td>$8.00</td>
</tr>
</tbody>
</table>

### August 26th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Engine</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>J. K. O'Meara</td>
<td>13 ft. 2 inches</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Ivan Stoughton</td>
<td>37 &quot; 10 &quot;</td>
<td>$12.00</td>
</tr>
<tr>
<td>3rd</td>
<td>E. D. Palmer</td>
<td>189 &quot;</td>
<td>$8.00</td>
</tr>
</tbody>
</table>

### August 28th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Engine</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Ivan Stoughton</td>
<td>41 ft. 8 inches</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd</td>
<td>W. H. Harris</td>
<td>67 &quot; 7 &quot;</td>
<td>$12.00</td>
</tr>
<tr>
<td>3rd</td>
<td>P. C. Skeels</td>
<td>184 &quot;</td>
<td>$8.00</td>
</tr>
</tbody>
</table>

### August 29th

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Engine</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>J. K. O'Meara</td>
<td>21 ft. 6 1/2 inches</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd</td>
<td>Ivan Stoughton</td>
<td>26 &quot; 8 &quot;</td>
<td>$12.00</td>
</tr>
<tr>
<td>3rd</td>
<td>P. C. Skeels</td>
<td>53 &quot; 5 1/2 &quot;</td>
<td>$8.00</td>
</tr>
</tbody>
</table>

### September 1st

<table>
<thead>
<tr>
<th>Place</th>
<th>Pilot</th>
<th>Engine</th>
<th>Cash Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>P. C. Skeels</td>
<td>3 ft. 1 1/4 inches</td>
<td>$20.00</td>
</tr>
<tr>
<td>2nd</td>
<td>W. H. Harris</td>
<td>28 &quot; 5 1/4 &quot;</td>
<td>$12.00</td>
</tr>
<tr>
<td>3rd</td>
<td>Ivan Stoughton</td>
<td>72 &quot; 7 &quot;</td>
<td>$8.00</td>
</tr>
</tbody>
</table>
OFFICIAL WORLD AND AMERICAN AIR RECORDS

Established Under Rules and Regulations of the
FEDERATION AERONAUTIQUE INTERNATIONALE

Translated and Compiled by the Contest Committee, National Aeronautic Association, Washington, D. C.

December 31, 1930

WORLD RECORDS

CONFIRMED BY FEDERATION AERONAUTIQUE INTERNATIONALE

AMERICAN RECORDS

CONFIRMED BY CONTEST COMMITTEE NATIONAL AERONAUTIC ASSOCIATION OF U. S. A.

AIRPLANES—CLASS C

RETURNING TO POINT OF DEPARTURE WITHOUT REFUELING


Distance (Closed Circuit) (Italy)—U. Maddalena and F. Cecconi, Savoia-Marchetti S-64, Fiat A-22 T, at Montecelio, Rome, May 30-June 2, 1939.

Duration (Closed Circuit) (France)—Coste and Bellonte, Breguet 19, Hispano-Suiza 600 HP, Le Bourget to Coulant, China, September 29-30, 1929.

Distance (Airline) (France)—Le-Cointe, Spaero R-3C-1, at Mitchel Field, Long Is., N. Y., November 4, 1923.

Speed for 1,000 Kilometers—Lt. Verville Liberty 375, at Wright Field, Dayton, O., March 29, 1923.

Duration (Closed Circuit)—William Brock and Edward Schlee, Bellanca, Wright Whirlwind 220 HP, at San Diego, Calif., September 29, 30, October 1, 1928.

Distance (Closed Circuit)—Lt. Kelly and Maercedes, U. S. A., T-2, Liberty 375 HP, at Wright Field, Dayton, O., April 16, 17, 1929.

Distance, 3,050 Kilo. (2,516.55 Miles).

Speed—Lt. A. J. Williams, U. S. N., Curtiss Racer R-2-C-1, Curtiss D-12-2 500 HP, at Wright Field, Dayton, O., March 29, 1923.

Speed, 429.025 KPH (266.59 MPH).

World and American Record.

Maximum Speed—Lt. A. J. Williams, U. S. A., Curtiss Racer R-2-C-1, Curtiss D-12-2 500 HP, at Wright Field, Dayton, O., March 29, 1923.

Speed, 429.025 KPH (266.59 MPH).

SPEEDS FOR SPECIFIED DISTANCES WITHOUT PAY LOAD

Speed for 100 Kilometers (United States)—Lt. Cyrus Betts, U. S. A., Curtiss R3C-1, Curtiss V-1400 600 HP, at Wright Field, L. I., N. Y., Oct. 12, 1925.

Speed, 402.279 KPH (249.342 MPH).

Maximum Speed (France)—Warrant Officer Bonnet, Ferbois monoplane, Hispano-Suiza 550 HP, at Istres, December 11, 1924.

Speed, 418.171 KPH (270.480 MPH).

SPEEDS FOR SPECIFIED DISTANCES WITHOUT REFUEILING

Speed for 1,000 Kilometers (Czechoslovakia)—Adjutant Chef Vojtech Svozil, Aero A-42, Asso 800 HP, on the Praga Nave Benathy Ripa-Praha Course, September 25, 1930.

Speed, 274.094 KPH (170.113 MPH).

Speed for 2,000 Kilometers (France)—Ferdinand Lasne, Nieuport-Delage 42C-1, Hispano-Suiza 500 HP, at Etampes, September 12, 1924.

Speed, 218.259 KPH (135.930 MPH).

Speed for 5,000 Kilometers (France)—Commandants Girler and Weis, Breguet Hispano-Suiza, 600 HP, at Etampes, May 24, 25, 1929.

Speed, 188.097 KPH (116.822 MPH).

Duration (Closed Circuit)—William Brock and Edward Schlee, Bellanca, Wright Whirlwind 220 HP, at San Diego, Calif., September 29, 30, October 1, 1928.

Distance (Closed Circuit)—Lt. Kelly and Maercedes, U. S. A., T-2, Liberty 375 HP, at Wright Field, Dayton, O., April 16, 17, 1929.

Distance, 4,050 Kilo. (2,516.55 Miles).

Duration (Airline)—Clarence D. Chamberlin, Bellanca Wright, J-5 200 HP, Roosevelt Field, L. I., N. Y., to Isleben, Germany, June 4, 5, 6, 1927.

Distance, 6,294 Kilo. (3,911 Miles).

World and American Record.

Speed for 2,000 Kilometers—Lt. A. J. Williams, U. S. A., Curtiss Racer R-2-C-1, Curtiss D-12-2 500 HP, at Wright Field, Dayton, O., March 29, 1923.

Speed, 270.066 KPH (167.80 MPH).

Speed for 1,000 Kilometers—Lt. Harold R. Harris, U. S. A., and Ralph Lockwood, DH-4L, Liberty 400 HP, at Wright Field, Dayton, O., March 29, 1923.

Speed, 205.66 KPH (127.42 MPH).


Speed, 270.066 KPH (167.80 MPH).

Speed for 1,000 Kilometers—Lt. Harold R. Harris, U. S. A., and Ralph Lockwood, DH-4L, Liberty 400 HP, at Wright Field, Dayton, O., March 29, 1923.

Speed, 205.66 KPH (127.42 MPH).

Speed for 5,000 Kilometers—Lt. Harold R. Harris, U. S. A., DH-4L, Liberty 375 HP, at Wright Field, Dayton, O., April 17, 1923.

Speed, 183.83 KPH (114.42 MPH).

Speed for 5,000 Kilometers—(No Record).
APPENDIX

CLASS C—WITH PAY LOAD OF 500 KILOGRAMS

(1,102.31 Lbs.)

**WORLD RECORDS**

Duration (France)—Coste and Codos, Breguet 19, Hispano-Suiza 600 HP, at Istres, January 17, 18, 1930.

Time, 23H, 22M, 49S.

Distance (France)—Coste and Codos, Breguet 19, Hispano-Suiza 600 HP, at Istres, January 17, 18, 1930.

Distance, 4,361,080 Kilo. (2,710.40 Miles).

Altitude (France)—J. Burtin, Breguet 19, Farman 500 HP, at Toussus-le-Noble, August 23, 1929.

Height, 9,374 Meters (30,654 Feet).

**AMERICAN RECORDS**

Duration—Lt. H. R. Harris, U. S. A., Douglas DT-2, Liberty 400 HP, at Wright Field, Dayton, O., June 28, 1924.

Time, 9H, 11M, 53.4S.

Distance—Lt. H. R. Harris, U. S. A., Douglas DT-2, Liberty 400 HP, at Wright Field, Dayton, O., June 28, 1924.

Distance, 599 Kilo. (370.3 Miles).

Altitude—Lt. H. R. Harris, U. S. A., USA-TP-1, Liberty 400 HP, at Wright Field, Dayton, O., May 21, 1924.

Height, 8,578 Meters (28,143 Feet).

**SPEEDS FOR SPECIFIED DISTANCES**

**Speeds for 100 Kilometers (United States)—** Leland F. Shoehair, Lockheed Vega Executive monoplane NC-308 H, Pratt & Whitney 500 HP supercharged, at Jacksonville, Fla., February 18, 1930.

Speed, 298.510 KPH (185.40 MPH).

Speed for 500 Kilometers (Czechoslovakia)—Captain Joseph Kalla, Letov S-516, Asso 800 HP, on the Praha Nave Benecky Ripa-Praha Course, October 12, 1930.

Speed, 276.375 KPH (171.731 MPH).

Speed for 1,000 Kilometers (Czechoslovakia)—Captain Joseph Kalla, Letov S-516, Asso 800 HP, on the Praha Nave Benecky Ripa-Praha Course, October 12, 1930.

Speed, 275.269 KPH (171.24 MPH).

Speed for 2,000 Kilometers (France)—Coste and Codos, Breguet 19, Hispano-Suiza 600 HP, at Istres, January 17, 18, 1930.

Speed, 214.553 KPH (133.32 MPH).

Speed for 5,000 Kilometers—(No Record).**

**CLASS C—WITH PAY LOAD OF 1,000 KILOGRAMS**

(2,204.12 Lbs.)

**RETURNING TO POINT OF DEPARTURE**

**WORLD RECORDS**

Duration (France)—Coste and Codos, Breguet 19, Hispano-Suiza 600 HP, at Istres, February 15, 16, 1930.

Time, 18H, 1M.

Distance (Closed Circuit) (France)—Coste and Codos, Breguet 19, Hispano-Suiza 600 HP, at Istres, February 15, 16, 1930.

Distance, 3,309,660 Kilo. (2,050.672 Miles).

Altitude (France)—J. Burtin, Breguet 19, Farman 600 HP, at Toussus-le-Noble, July 26, 1929.

Height, 8,089 Meters (26,538 Feet).

**AMERICAN RECORDS**

Duration—Lt. J. S. Macready, U. S. A., Curtiss (Martin) Bomber NBS 1, 2 Liberty 400 HP, at Wright Field, Dayton, O., Oct. 2, 1924.

Time, 2H, 13M, 49.6S.

Distance (Closed Circuit)—(No Record).

Altitude—Waldo Waterman, Bach, Wright J-6, at Los Angeles, Calif., July 26, 1929.

Height, 6,346 Meters (20,820 Feet).
SPEEDS FOR SPECIFIED DISTANCES

Speed for 100 Kilometers (United States)—
Speed, 283.250 KPH (176 MPH).

Speed for 500 Kilometers (United States)—
Speed, 270.800 KPH (168.27 MPH).

Speed for 1,000 Kilometers (Czechoslovakia)—Adjutant Chef Vojtech Svobil, Aero A-42, Asso 800 HP, on the Prague Nave Benatky Ripa-Praha Course, September 25, 1930.
Speed, 252.380 KPH (156.82 MPH).

Speed for 2,000 Kilometers (Germany)—
Herman Steindorff, Rohrbach-Roland, 3 BMW 230 HP ea., at Staaken, July 28, 1927.
Speed, 205.407 KPH (127.632 MPH).

Speed for 5,000 Kilometers—(No Record).

CLASS C—WITH PAY LOAD OF 2,000 KILOGRAMS
(4,409.24 Lbs.)

RETURNING TO POINT OF DEPARTURE

World Records

Duration (Germany)—J. Ritzsies, Junkers G-24, Junkers 260 HP, at Dessau, June 29, 1927.
Time, 13H, 1M, 12.8S.

Distance (Germany)—Herman Steindorff, Rohrbach-Roland, 3 BMW 230 HP ea., at Staaken, July 31, 1927.
Distance, 1,750.469 Kilo, (1,087.68 Miles).

Altitude (Italy)—Democrito Antonini, Caproni CA-73, 2 Isotta Fraschini 500 HP ea., at Casicina Malpensa, May 26, 1927.
Height, 6,262 Meters (20,544 Feet).

American Records

Duration—Lt. H. R. Harris, U. S. A., and Mechanician Doug Culver, Darling Bomber, 6 Liberty 400 HP ea., at Wright Field, Dayton, O., October 3, 1924.
Time, 11H, 47M, 10.5S.

Distance—(No Record).

Altitude—Lt. H. R. Harris, U. S. A., Darling Bomber, 6 Liberty 400 HP ea., at Wright Field, Dayton, O., October 25, 1924.
Height, 2,049 Meters (6,722 Feet).

SPEEDS FOR SPECIFIED DISTANCES

Speed for 100 Kilometers (United States)—
Speed, 261.620 KPH (164.432 MPH).

Speed for 500 Kilometers (Germany)—
Herman Steindorff, Rohrbach-Roland, 3 BMW 230 HP ea., at Staaken, July 28, 1927.
Speed, 215.328 KPH (133.828 MPH).

Speed for 1,000 Kilometers (Germany)—
Herman Steindorff, Rohrbach-Roland, 3 BMW 230 HP ea., at Staaken, July 28, 1927.
Speed, 214.835 KPH (133.504 MPH).

Speed for 2,000 Kilometers—(No Record).

Speed for 5,000 Kilometers—(No Record).

Speed for 1,000 Kilometers—Leland F. Shoemaker, Lockheed Vega Executive monoplane NC-308 H, Pratt & Whitney 450 HP supercharged, at Jacksonville, Fla., February 20, 1930.
Speed, 245.750 KPH (152.70 MPH).

Speed for 2,000 Kilometers—(No Record).

Speed for 5,000 Kilometers—(No Record).
## APPENDIX

### CLASS C—WITH PAY LOAD OF 5,000 KILOGRAMS (11,023 Lbs.)

**World Records**

<table>
<thead>
<tr>
<th>Duration (Germany)</th>
<th>Wilhelm Zimmerman, Junkers J-35, 2 Junkers L-55, 600 HP ea., at Dessau-Leipzig, April 10, 1930.</th>
<th>American Records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed for 1,000 Kilometers (Germany)</td>
<td>Wilhelm Zimmerman, Junkers J-35, 2 Junkers L-55, 600 HP ea., at Dessau-Leipzig, April 10, 1930.</td>
<td>Duration—(No Record).</td>
</tr>
<tr>
<td>Speed for 2,000 Kilometers—(No Record).</td>
<td>Speed for 4,000 Kilometers—(No Record).</td>
<td>Distance—(No Record).</td>
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</tbody>
</table>

**Airplanes—Class C—with Pay Load of 7,500 KILOGRAMS**

<table>
<thead>
<tr>
<th>Duration (Italy)</th>
<th>Cav. Domenico Antonini, Caproni Ca-90 biplane, 6 Isotta-Fraschini Asso 1,000 HP ea., at Cascina Malpensa, February 22, 1930.</th>
<th>American Records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed for 1,000 Kilometers—(No Record).</td>
<td>Speed for 2,000 Kilometers—(No Record).</td>
<td>Altitude—(No Record).</td>
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<tr>
<td>Speed for 5,000 Kilometers—(No Record).</td>
<td>Speed for 100 Kilometers—(No Record).</td>
<td>Distance—(No Record).</td>
</tr>
</tbody>
</table>

**Speeds for Specified Distances**

| Speed for 100 Kilometers—(No Record). | Speed for 500 Kilometers—(No Record). |
| Speed for 2,000 Kilometers—(No Record). | Speed for 5,000 Kilometers—(No Record). |

### CLASS C—WITH PAY LOAD OF 10,000 KILOGRAMS

**World Records**

<table>
<thead>
<tr>
<th>Duration (Italy)</th>
<th>Cav. Domenico Antonini, Caproni Ca-90 biplane, 6 Isotta-Fraschini Asso 1,000 HP ea., at Cascina Malpensa, February 22, 1930.</th>
<th>American Records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed for 1,000 Kilometers—(No Record).</td>
<td>Speed for 2,000 Kilometers—(No Record).</td>
<td>Altitude—(No Record).</td>
</tr>
<tr>
<td>Speed for 5,000 Kilometers—(No Record).</td>
<td>Speed for 100 Kilometers—(No Record).</td>
<td>Distance—(No Record).</td>
</tr>
</tbody>
</table>

**Altitude**

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<tr>
<th>Duration (Italy)</th>
<th>Cav. Domenico Antonini, Caproni Ca-90 biplane, 6 Isotta-Fraschini Asso 1,000 HP ea., at Cascina Malpensa, February 22, 1930.</th>
<th>American Records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed for 1,000 Kilometers—(No Record).</td>
<td>Speed for 2,000 Kilometers—(No Record).</td>
<td>Altitude—(No Record).</td>
</tr>
<tr>
<td>Speed for 5,000 Kilometers—(No Record).</td>
<td>Speed for 100 Kilometers—(No Record).</td>
<td>Distance—(No Record).</td>
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</table>

**Distance**

<table>
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<th>Duration (Italy)</th>
<th>Cav. Domenico Antonini, Caproni Ca-90 biplane, 6 Isotta-Fraschini Asso 1,000 HP ea., at Cascina Malpensa, February 22, 1930.</th>
<th>American Records</th>
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</thead>
<tbody>
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<td>Speed for 1,000 Kilometers—(No Record).</td>
<td>Speed for 2,000 Kilometers—(No Record).</td>
<td>Altitude—(No Record).</td>
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<tr>
<td>Speed for 5,000 Kilometers—(No Record).</td>
<td>Speed for 100 Kilometers—(No Record).</td>
<td>Distance—(No Record).</td>
</tr>
</tbody>
</table>
SPEEDS FOR SPECIFIED DISTANCES

Class C - Greatest Pay Load Carried to an Altitude of 2,000 Meters

(6,671.7 Feet)

World Records

| Speed for 100 Kilometers | (No Record) |
| Speed for 500 Kilometers | (No Record) |
| Speed for 1,000 Kilometers | (No Record) |
| Speed for 2,000 Kilometers | (No Record) |
| Speed for 5,000 Kilometers | (No Record) |

American Records

| Speed for 100 Kilometers | (No Record) |
| Speed for 500 Kilometers | (No Record) |
| Speed for 1,000 Kilometers | (No Record) |
| Speed for 2,000 Kilometers | (No Record) |
| Speed for 5,000 Kilometers | (No Record) |

Airplanes - Class C - Refueling in Flight Returning to Point of Departure

World Records

| Duration (United States) | John and Kenneth Hunter, Stinson Detroit, Wright-Whirlwind 300 HP, at Northbrook, Ill., June 11, 1930-July 4, 1930. |
| Time, 55 hours, 41 minutes, 36 seconds. |
| Distance (United States) | Lt. Smith and Richter, U. S. A., DH-4-B, Liberty 400 HP, at Rockwell Field, San Diego, Calif., August 27, 28, 1923. |
| Distance, 5,300 Kilometer (3,293.26 Miles). |

American Records

| World and American Record. |

Airplanes - Class C - Women's Category

World Records

| Duration (France) | Madame Maryse Bastie, Klemm, Salmson 40 HP, at Le Bourget, September 2, 3, 4, 1930. |
| Time, 37 hours, 4 minutes. |
| Distance (Airline) (France) | Mademoiselle Lena Bornstein, Caudron, Salmson 40 HP, Istres to Sidi Baramy, Egypt, August 19, 20, 21, 1929. |
| Distance, 2,969 Kilo. (1,849.27 Miles). |
| Altitude (United States) | Miss Ruth B. Alexander, Barling N. B. 3, Warner Scarab, Jr. 90 HP, at San Diego, Calif., July 11, 1930. |
| Height, 6,583 Meters (21,598 Feet). |

American Records

| World and American Record. |

Light Airplanes - Class C - First Category

Two seaters weight empty less than 400 Kgs. (881 Lbs.)

World Records

| Duration (Closed Circuit) (Italy) | Renato Donati and M. Capannini, Fiat A. S. 1, Fiat A.59, at Montecelio, Rome, January 19, 20, 1930. |
| Time, 28 hours, 4 minutes. |
| Distance (Closed Circuit) (Italy) | Renato Donati and M. Capannini, Fiat A. S. 1, Fiat A.59, at Montecelio, Rome, January 19, 20, 1930. |
| Distance, 2,746.200 Kilo. (1,706.405 Miles). |

American Records

| Duration (Closed Circuit) (Italy) | (No Record). |
| Distance (Closed Circuit) | (No Record). |
APPENDIX

WORLD RECORDS

Distance (Airline) (Switzerland)—Capt. Hans Wirth and Melle Erika Nauman, Klemm-Daimler, Mercedes-Daimler 20 HP, Boblingen Airport to Mieschkanke, Poland, October 16, 1928.
Distance, 1,305.5 Kilo. (811.10 Miles).
Altitude (Germany)—Woldemar Voigt and K. H. Gaule, Akademische Fliegergruppe Darmstadt D-18, Armstrong Siddeley Genet Major 100 HP, at Darmstadt, April 21, 1930.
Height, 7,521 Meters (24,672 Feet).

AMERICAN RECORDS

Distance (Airline)—(No Record).

Height, 5,652 Meters (18,543 Feet).

SPEEDS FOR SPECIFIED DISTANCES

Speed for 100 Kilometers (Germany)—Rudolf Neininger and Kurt Stark, Akademische Fliegergruppe Darmstadt D-18, Armstrong Siddeley Genet Major 100 HP, at Darmstadt, April 23, 1930.
Speed, 214.848 KPH (133.49 MPH).

CLASS C—SECOND CATEGORY

Two seaters weight empty less than 200 Kgs. (440 Lbs.)

WORLD RECORDS

Distance (Closed Circuit)—(No Record).

Altitude (Germany)—Madame Margaret Fubsahn and M. Fubsahn, Klemm L-25, Salmond 40 HP, at Boblinger-Wartemberg, April 11, 1930.
Height, 4,614 Meters (13,137 Feet).

AMERICAN RECORDS

Distance (Closed Circuit)—(No Record).

SPEEDS FOR SPECIFIED DISTANCE

Speed for 100 Kilometers—(No Record).

CLASS C—THIRD CATEGORY

Single seaters weight empty 200-350 Kgs. Inc. (440-771 Lbs.)

WORLD RECORDS

Duration (France)—Madame Mariese Bastie, Klemm, Salmond 40 HP, at Le Bourget, September 2-4, 1930.
Time, 371/2, 55 M.
Distance (Closed Circuit) (France)—Pilot Lauhe, Albert, Salmond 40 HP, at Le Bourget, September 4, 5, 1930.
Distance, 2,714.400 Kilo. (1,686.646 Miles).
Distance (Airline) (United States)—D. S. Zimmerly, Balring NB-3, LeBlond 60 HP, Brownsville, Texas, to Winnipeg City, Canada, July 17, 1929.
Distance, 2,655 Kilo. (1,650 Miles).
Altitude (Germany)—Woldemar Voigt, Akademische Fliegergruppe Darmstadt D-18, Armstrong Siddeley Genet Major 100 HP, at Darmstadt, May 23, 1930.
Height, 8,142 Meters (26,712 Feet).

AMERICAN RECORDS

Duration—(No Record).

Distance (Closed Circuit)—(No Record).

World and American Record.

Altitude—D. S. Zimmerly, Balring NB-3, Lambert R-266 90 HP, at St. Louis, Mo., February 16, 1930.
Height, 7,338 Meters (24,074 Feet).

SPEEDS FOR SPECIFIED DISTANCES

Speed for 100 Kilometers (Great Britain)—Capt. H. S. Broad, DH Tiger Moth, DH 32 130 HP, at Stag Lane, August 24, 1927.
Speed, 300.1 KPH (186.47 MPH).

Speed for 100 Kilometers—(No Record).
CLASS C—FOURTH CATEGORY

Single seaters weight empty less than 200 Kgs. (440 Lbs.)

WORLD RECORDS

Duration (France)—G. Fauvel, Mauaussin Peyret A. B. C. Scorpion 34 HP, at Le Bourget, September 12, 1930.

Distance (Closed Circuit) (Hungary)—Ing. Arpad Lampich, "Roma" Comte de Thuroccklay 18 HP, at Matyasfold-Monor, June 14, 1930.

Distance 1,033.368 Kilo. (642.104 Miles).

Distance (France)—G. Fauvel, Mauaussin Peyret, A. B. C. Scorpion 34 HP, at Le Bourget, September 12, 1930.

Distance 1,258.800 Kilo. (783.156 Miles).

Altitude (France)—G. Fauvel, Mauaussin Peyret A. B. C. Scorpion, at Le Bourget, September 5, 1929.

Height, 5,193 Meters (17,037 Feet).

Speed for 100 Kilometers (United States)


Speed, 162.21 KPH (100.79 MPH).

SEAPLANES—CLASS C2

RETURNING TO POINT OF DEPARTURE WITHOUT REFUELING

WORLD RECORDS

Duration (United States)—Lts. Arthur Gavin and Zeus Sourcek, Navy PN-12, 2 Wright R-1720 525 HP ea. at Philadelphia, Pa., May 5, 4, 5, 1928.

Time, 36H, 1M.

Distance (France)—Mermoz, Latécoère 28, Hispano-Suiza 600 HP, at Marignane, April 11, 12, 1930.

Distance, 4,308.340 Kilo. (2,677 Miles).

Distance (Airline) (France)—Mermoz, Darby, and Gimic, Latécoère 28, Hispano-Suiza 500 HP, St. Louis, Senegal, to Natal, Brazil, May 12, 13, 1930.

Distance, 3,173.200 Kilo. (1,971.731 Miles).

Altitude (United States)—Lt. Apollo Soucek, "Apache", Curtiss R-600 450 HP, at Wash.; Washington, D. C., June 4, 1929.

Height, 11,753 Meters (38,560 Feet).

Maximum Speed (England)—Squadron Leader A. H. Orlebar, Supermarine Rolls Royce S-6, Rolls Royce R-6, at Spithead, September 12, 1929.

Speed, 577 KPH (357.743 MPH).

SPEEDS FOR SPECIFIED DISTANCES

Speed for 100 Kilometers (Great Britain)—Flying Officer Atcherley, Rolls-Royce Supermarine, Rolls-Royce R, at Spithead, September 7, 1920.

Speed, 529.800 KPH (321.687 MPH).

Speed for 500 Kilometers (United States)


Speed, 259.288 KPH (161.14 MPH).

Speed for 1,000 Kilometers (Germany)—Rolf Staffe, Heinkel HE-9, BMW-6 600 HP, at Warnemünde, June 10, 1929.

Speed, 222.577 KPH (138.116 MPH).

Speed for 2,000 Kilometers (France)—Lieut. de Vaisseau Paris and M. Hohert, Latécoère 28, Hispano-Suiza 600 HP, at St. Laurent de la Salanque, June 23, 1930.

Speed, 185.931 KPH (117.396 MPH).

Speed for 5,000 Kilometers—(No Record).

AMERICAN RECORDS

Duration—(No Record).

Distance (Closed Circuit)—(No Record).

Distance (Airline)—(No Record).

Altitude—(No Record).

World and American Record.
CLASS C2—WITH PAY LOAD OF 500 KILOGRAMS (1,102.31 Lbs.)

RETURNING TO POINT OF DEPARTURE

**World Records**

Duration (France)—Lieut. de Vaisseau Paris and M. Hebert, Latécoère 28, Hispano-Suiza 600 HP, at St. Laurent de la Salanque, June 23, 1928.
Time, 31h, 13m.
Distance (France)—Lieut. de Vaisseau Paris and M. Hebert, Latécoère 28, Hispano-Suiza 600 HP, at St. Laurent de la Salanque, July 17, 1930.
Distance, 4,202.496 Kilos. (2,611.305 Miles).
Altitude (Germany)—Fritz Harder, Junkers W-34, Bristol Jupiter VII 420 HP, at Dessau, November 6, 1928.
Height, 7,458 Meters (24,749 Feet).

**American Records**

Time, 26h, 45m, 46s.
Distance, 2,575 Kilos. (1,569 Miles).
Altitude—Boris Sergievsky, Sikorsky S-38, 2 Type B Pratt & Whitney Hornets 575 HP ea., at North Beach, Queens, New York, June 15, 1930.
Height, 8,037 Meters (26,368 Feet).

**Speeds for Specified Distances**

Speed for 100 Kilometers (Germany)—
Rolf Starke, Heinkel HD-38, BMW-6 600 HP, at Warnemünde, May 7, 1929.
Speed, 259.927 KPH (161.516 MPH).
Speed for 500 Kilometers (Germany)—
Rolf Starke, Heinkel HE-9a, BMW-6 600 HP, at Warnemünde, May 21, 1929.
Speed, 235.941 KPH (146.666 MPH).
Speed for 1,000 Kilometers (Germany)—
Rolf Starke, Heinkel HE-9, BMW-6 600 HP, at Warnemünde, June 10, 1929.
Speed, 222.277 KPH (138.116 MPH).
Speed for 2,000 Kilometers (France)—
Lieut. de Vaisseau Paris and M. Hebert, Latécoère 28, Hispano 600 HP, at St. Laurent de la Salanque, June 23, 1930.
Speed, 185.931 KPH (117.396 MPH).
Speed for 5,000 Kilometers—(No Record).

**CLASS C2—WITH PAY LOAD OF 1,000 KILOGRAMS (2,204.62 Lbs.)**

**World Records**

Duration (France)—Lieut. de Vaisseau Paris and M. Hebert, Latécoère 28, Hispano-Suiza 600 HP, at St. Laurent de la Salanque, June 23, 1930.
Time, 20h, 2m.
Distance (France)—Lieut. de Vaisseau Paris and M. Hebert, Latécoère 28, Hispano-Suiza 600 HP, at St. Laurent de la Salanque, June 23, 1930.
Distance, 2,854.244 Kilos. (1,773.603 Miles).
Altitude (United States)—Boris Sergievsky, Sikorsky S-38, 2 Pratt & Whitney Hornets 575 HP ea., at Bridgeport, Conn., July 21, 1930.
Height, 8,208 Meters (26,929 Feet).

**American Records**

Time, 17h, 55m, 13s.
Distance, 2,150 Kilos. (1,336 Miles).
World and American Record.
### SPEEDS FOR SPECIFIED DISTANCES

<table>
<thead>
<tr>
<th>Distance (United States)</th>
<th>Speed (KPH)</th>
<th>Speed (MPH)</th>
<th>World and American Record.</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 Kilometers</td>
<td>266.71</td>
<td>165.73</td>
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<tr>
<td>500 Kilometers</td>
<td>235.94</td>
<td>146.60</td>
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<tr>
<td>1,000 Kilometers</td>
<td>190.004</td>
<td>118.08</td>
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<td>2,000 Kilometers</td>
<td>231.38</td>
<td>143.77</td>
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<tr>
<td>3,000 Kilometers</td>
<td>185.931</td>
<td>117.39</td>
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<tr>
<td>5,000 Kilometers</td>
<td>202.092</td>
<td>125.57</td>
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</table>

### CLASS C2—WITH PAY LOAD OF 2,000 KILOGRAMS (4,400.24 Lbs.)

**WORLD RECORDS**

- Time, 16H, 39M.
- Distance, 2,750 Kilo. (1,336 Miles).
- Altitude (United States)—Boris Sergievsky, Sikorsky S-38, 2 Pratt & Whitney Wasps 425 HP ea., at Stratford, Conn., August 11, 1930.
- Height, 6,974 Meters (19,028 Feet).

**AMERICAN RECORDS**

- World and American Record.

### SPEEDS FOR SPECIFIED DISTANCES

<table>
<thead>
<tr>
<th>Distance (United States)</th>
<th>Speed (KPH)</th>
<th>Speed (MPH)</th>
<th>World and American Record.</th>
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</thead>
<tbody>
<tr>
<td>500 Kilometers</td>
<td>192.74</td>
<td>119.69</td>
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<tr>
<td>1,000 Kilometers</td>
<td>145.68</td>
<td>90.52</td>
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<tr>
<td>2,000 Kilometers</td>
<td>130.427</td>
<td>81.043</td>
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</tr>
<tr>
<td>5,000 Kilometers</td>
<td>142.74</td>
<td>88.69</td>
<td></td>
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</tbody>
</table>

**World and American Record.**
APPENDIX

CLASS C2—WITH PAY LOAD OF 4,000 KILOGRAMS (8,818 Lbs.)
RETURNING TO POINT OF DEPARTURE

WORLD RECORDS
Duration (Germany)—Richard Wagner, Dornier Superwal DR-142, 4 Gnome-Rhone-Jupiter 480 HP ea., at Friedrichshaven-Lindau, February 5, 1928.
Distance (Germany)—Richard Wagner, Dornier Superwal DR-142, 4 Gnome-Rhone-Jupiter 480 HP ea., at Friedrichshaven-Lindau, February 5, 1928.
Altitude (Germany)—Richard Wagner, Dornier Superwal DR-142, 4 Gnome-Rhone-Jupiter 480 HP ea., at Friedrichshaven-Lindau, January 23, 1928.

AMERICAN RECORDS
Duration—(No Record).
Distance—(No Record).
Altitude—(No Record).

SPEEDS FOR SPECIFIED DISTANCES
Speed for 100 Kilometers (Germany)—Richard Wagner, Dornier Superwal DR-142, 4 Gnome-Rhone-Jupiter 480 HP ea., at Friedrichshaven-Lindau, January 20, 1928.
Speed, 209.546 KPH (130.105 MPH).
Speed for 500 Kilometers (Germany)—Richard Wagner, Dornier Superwal DR-142, 4 Gnome-Rhone-Jupiter 480 HP ea., at Friedrichshaven-Lindau, February 2, 1928.
Speed, 179.416 KPH (111.483 MPH).
Speed for 1,000 Kilometers (Germany)—Richard Wagner, Dornier Superwal DR-142, 4 Gnome-Rhone-Jupiter 480 HP ea., at Friedrichshaven-Lindau, February 2, 1928.
Speed, 177.279 KPH (110.153 MPH).

CLASS C2—WITH PAY LOAD OF 5,000 KILOGRAMS (11,023 Lbs.)
RETURNING TO POINT OF DEPARTURE

WORLD RECORDS
Duration—(No Record).
Distance—(No Record).
Altitude (Germany)—Steindorff, Rohrbach Romar, 2 BMW 500 HP ea., at Travemunde, April 17, 1929.
Height, 2,000 Meters (6,562 Feet).
Speed for 100 Kilometers—(No Record).
Speed, 212.56 KPH (130.36 MPH).
Speed for 500 Kilometers—(No Record).
Speed for 1,000 Kilometers—(No Record).
Speed for 2,000 Kilometers—(No Record).
Speed for 5,000 Kilometers—(No Record).

AMERICAN RECORDS
Duration—(No Record).
Distance—(No Record).
Altitude—(No Record).

SPEEDS FOR SPECIFIED DISTANCES
Speed for 100 Kilometers—(No Record).
Speed for 500 Kilometers—(No Record).
Speed for 1,000 Kilometers—(No Record).
Speed for 2,000 Kilometers—(No Record).
Speed for 5,000 Kilometers—(No Record).

CLASS C2—WITH PAY LOAD OF 7,500 KILOGRAMS (16,535 Lbs.)
RETURNING TO POINT OF DEPARTURE WITHOUT REFUELING

WORLD RECORDS
Duration—(No Record).
Distance—(No Record).
Altitude—(No Record).

AMERICAN RECORDS
Duration—(No Record).
Distance—(No Record).
Altitude—(No Record).

SPEEDS FOR SPECIFIED DISTANCES
Speed for 100 Kilometers—(No Record).
Speed for 500 Kilometers—(No Record).
Speed for 1,000 Kilometers—(No Record).
Speed for 2,000 Kilometers—(No Record).
Speed for 5,000 Kilometers—(No Record).
AIRCRAFT YEAR BOOK

CLASS C2—WITH PAY LOAD OF 10,000 KILOGRAMS (22,046 Lbs.)
RETURNING TO POINT OF DEPARTURE WITHOUT REFUELING

WORLD RECORDS
Duration—(No Record).
Distance—(No Record).
Altitude—(No Record).

AMERICAN RECORDS
Duration—(No Record).
Distance—(No Record).
Altitude—(No Record).

SPEEDS FOR SPECIFIED DISTANCES

<table>
<thead>
<tr>
<th>Distance</th>
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<th>American Records</th>
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<td>(No Record)</td>
<td>(No Record)</td>
</tr>
<tr>
<td>500 Kilometers</td>
<td>(No Record)</td>
<td>(No Record)</td>
</tr>
<tr>
<td>1,000 Kilometers</td>
<td>(No Record)</td>
<td>(No Record)</td>
</tr>
<tr>
<td>2,000 Kilometers</td>
<td>(No Record)</td>
<td>(No Record)</td>
</tr>
<tr>
<td>5,000 Kilometers</td>
<td>(No Record)</td>
<td>(No Record)</td>
</tr>
</tbody>
</table>

CLASS C2—GREATEST PAY LOAD CARRIED TO AN ALTITUDE OF 2,000 METERS (6651.7 Feet)

WORLD RECORDS
(Germany)—Steindorff, Rohrbach Romar, 3 BMW 500 HP ea., at Trave munde, April 17, 1929.
Weight, 6,430 Kgs. (14,220 Lbs.).

AMERICAN RECORDS
Weight, 3,504 Kgs. (7,726 Lbs.).

CLASS C2—LIGHT SEAPLANES—FIRST CATEGORY
Two seaters weight empty less than 600 Kgs. (1,322 Lbs.)

WORLD RECORDS
Duration (Germany)—Alfred Grundke and Gottlieb Pfeiffer, Junkers J 50-W, Armstrong Siddeley Genet 85 HP, at Dessau, June 6, 1930.
Time, 8H; 27M.
Distance (Closed Circuit) (Germany)—Alfred Grundke and Gottlieb Pfeiffer, Junkers J 50-W, Armstrong Siddeley Genet 85 HP, at Dessau, June 6, 1930.
Distance, 900.180 Kilo. (599.344 Miles).
Distance (Airline) (France)—(No Record).
Altitude (Germany)—Wilhelm Zimmermann and Schinzinger, Junkers J 50-W, Armstrong Siddeley Genet 85 HP, at Dessau, June 4, 1930.
Height, 4,614 Meters (15,137.765 Feet).
Speed for 100 Kilometers (Germany)—Alfred Grundke and Gottlieb Pfeiffer, Junkers J 50-W, Armstrong Siddeley Genet 85 HP, at Dessau, June 6, 1930.
Speed, 164.309 KPH (102.096 MPH).

AMERICAN RECORDS
Duration—(No Record).
Distance (Closed Circuit)—(No Record).
Distance (Airline)—(No Record).
Altitude—(No Record).
Speed for 100 Kilometers—(No Record).

CLASS C2—LIGHT SEAPLANES—SECOND CATEGORY
Two seaters weight empty less than 350 Kgs. (771 Lbs.)

WORLD RECORDS
Duration—(No Record).
Distance (Closed Circuit)—(No Record).
Distance (Airline)—(No Record).
Altitude—(No Record).
Speed for 100 Kilometers—(No Record).

AMERICAN RECORDS
Duration—(No Record).
Distance (Closed Circuit)—(No Record).
Distance (Airline)—(No Record).
Altitude—(No Record).
Speed for 100 Kilometers—(No Record).
APPENDIX

CLASS C2—LIGHT SEAPLANES—THIRD CATEGORY

Single seater weight empty between 250 and 437.5 Kgs. (551-963 Lbs.)

WORLD RECORDS

| CLASS C2—LIGHT SEAPLANES—FOURTH CATEGORY

Single seater weight less than 250 Kgs. (551 Lbs.)

WORLD RECORDS

| Duration—(No Record). Distance (Closed Circuit)—(No Record). Distance (Airline)—(No Record). Speed for 100 Kilometers—(No Record). Altitude—(No Record). Speed for 100 Kilometers—(No Record). |

CLASS A—Balloons

FIRST CATEGORY (600 CUBIC METERS)

WORLD RECORDS

| Duration (France)—G. Cormier, August 10, 11, 1924. Time, 22H, 34M. Distance (France)—Georges Cormier, July 1, 1922. Distance, 804.173 Kilo. (499.69 Miles). Altitude—(No Record). |
| SECOND CATEGORY (601-900 CUBIC METERS)

| Duration (France)—Jules Dubois, May 14, 15, 1922. Time, 23H, 28M. Distance (France)—Georges Cormier, July 1, 1922. Distance, 804.173 Kilo. (499.69 Miles). Altitude—(No Record). |
| THIRD CATEGORY (901-1,200 CUBIC METERS)

| Duration (United States)—E. J. Hill and A. G. Schlosser, Ford Airport to Montvale, Va., July 4, 5, 1927. Time, 26H, 46M. Distance (United States)—S. A. U. Ramsussen, Ford Airport to Hookerton, N. C., July 4, 5, 1927. Distance, 920.348 Kilo. (571 Miles). Altitude—(No Record). |
FOURTH CATEGORY (1,201-1,600 CUBIC METERS)

Duration (United States)—E. J. Hill and A. G. Schlosser, Ford Airport to Montvale, Va., July 4, 5, 1927.
Time, 26H, 46M.
Distance (United States)—S. A. U. Rasmussen, Ford Airport to Hookerton, N. C., July 4, 5, 1927.
Distance, 920.438 Kilo. (571 Miles).
Altitude—(No Record).

FIFTH CATEGORY (1,601-2,200 CUBIC METERS)

Duration (France)—Georges Blanchet and Dr. Geo. LeGallée, Gordon Bennett, Detroit to Waverly Hall, Ga., Sept. 10, 11, 12, 1927.
Time, 49H.
Distance (United States)—Lt. T. G. W. Settle and Ensign W. Bushnell, Pittsburgh, Pa., to Savage Harbor, Prince Edward Island, Canada, May 4, 5, 6, 1929.
Distance, 1,351.768 Kilo. (852 Miles).
Altitude—(No Record).

SIXTH CATEGORY (2,201-3,000 CUBIC METERS)

Duration (France)—Georges Blanchet and Dr. Geo. LeGallée, Gordon Bennett, Detroit to Waverly Hall, Ga., Sept. 10, 11, 12, 1927.
Time, 49H.
Distance (United States)—Lt. T. G. W. Settle and Ensign W. Bushnell, Pittsburgh, Pa., to Savage Harbor, Prince Edward Island, Canada, May 4, 5, 6, 1929.
Distance, 1,351.768 Kilo. (852 Miles).
Altitude—(No Record).

SEVENTH CATEGORY (3,001-4,000 CUBIC METERS)

Duration (France)—Georges Blanchet and Dr. Geo. LeGallée, Gordon Bennett, Detroit to Waverly Hall, Ga., Sept. 10, 11, 12, 1927.
Time, 49H.
Distance (United States)—Lt. T. G. W. Settle and Ensign W. Bushnell, Pittsburgh, Pa., to Savage Harbor, Prince Edward Island, Canada, May 4, 5, 6, 1929.
Distance, 1,351.768 Kilo. (852 Miles).
Altitude—(No Record).

EIGHTH CATEGORY (4,001-5,000 CUBIC METERS)

Duration (France)—H. Kaulen, December 13-17, 1913.
Time, 87H.
Distance (France)—Berliner, February 8-10, 1914.
Distance, 3,052.7 Kilo. (1,896.9 Miles).
Altitude (Germany)—Suring and Berson, June 30, 1921.
Height, 8,690 Meters (28,510 Feet).
APPENDIX

CLASS B—AIRSHIPS

RETURNING TO POINT OF DEPARTURE

WORLD RECORDS

Duration (Germany)—Dr. Eckener, "Graf Zeppelin", 5 Maybach, from Lakehurst, N. J., to Friedrichshaven, Germany, November 29, 30, 31, 1928.
Time, 71H, 7M.
Distance (Germany)—Dr. Hugo Eckener, "Graf Zeppelin", 5 Maybach, Lakehurst, N. J., to Friedrichshaven, Germany, November 29, 30, 31, 1928.
Distance, 6,384.5 Kilo. (3,967 Miles).
Altitude (France)—Colin, at Conts, June 18, 1912.
Height, 3,080 Meters (10,102 Feet).

AMERICAN RECORDS

Time, 40H, 26M.
Distance—(No Record).
Altitude—(No Record).

SPEEDS FOR SPECIFIED DISTANCES

Speed for 100 Kilometers—(No Record).
Speed for 500 Kilometers—(No Record).
Speed for 1,000 Kilometers—(No Record).
Speed for 2,000 Kilometers—(No Record).
Speed for 5,000 Kilometers—(No Record).

GLIDERS

WORLD RECORDS

Duration (Germany)—Ferdinand Schulz, glider "Westpreussen", Rossitten Field, May 3, 1927.
Time, 14H, 7M.

AMERICAN RECORDS

Duration—(No Record).
Distance—(No Record).
Altitude—(No Record).

GREATEST DISTANCE OVER CLOSED COURSE

Duration (Germany)—Ferdinand Schulz, glider "Westpreussen", Rossitten Field, May 3, 1927.
Distance, 455.8 Kilo. (283.22 Miles).

GREATEST DISTANCE IN A STRAIGHT LINE

Duration (Austria) — Robert Kronfeld, "Wien" Rhon-Rossiter, Lienlas, July 30, 1929.
Distance, 149.420 Kilo. (92.843 Miles).

SPEED OVER A CLOSED COURSE

Speed (Germany) — Ferdinand Schulz, glider "Westpreussen", Rossitten Field, May 5, 1927.
Speed, 54.545 KPH (33.892 MPH).

ALTITUDE ABOVE STARTING POINT

Altitude (Germany) — Robert Kronfeld, "Wien" Rhon-Rossiter, Lienlas, July 30, 1929.
Height, 2,589 Meters (8,494 Feet).
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