

AIRCRAFT YEAR BOOK



1928

AIRCRAFT YEAR BOOK, 1928



Naval Aircraft Carrier U. S. S. "Saratoga," sister ship to the "Lexington,"
put in service 1927.—From painting by *Waller L. Greene*,
Courtesy General Electric Co.

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FOREWORD

IN editing and preparing data for the tenth successive *Aircraft Year Book*, acknowledgment is gratefully made to the Assistant Secretaries for Aviation, Hon. F. Trubee Davison, Hon. Edward P. Warner and Hon. William P. MacCracken, and to the Second Assistant Postmaster General, Hon. W. Irving Glover; also to the Chief of the Air Corps, Maj. Gen. James E. Fechet; the Chief of the Bureau of Naval Aeronautics, Rear Admiral William A. Moffett; Dr. George W. Lewis, Director of Aeronautical Research, and John F. Victory, Secretary of the National Advisory Committee for Aeronautics; and to all other officers and men in the Government Service through whose sympathetic and prompt assistance the collection and compilation of complete data has been made possible.

Special appreciation is due to the press, motion picture and news services for their intelligent and constructive treatment of news items and for their discerning interpretation of aeronautical events. Through their co-operation, genuine public confidence in aerial transportation—the great accomplishment of the year—is now manifest throughout the world.

Sincere acknowledgment is also made to the progressive libraries in this and other countries whose support has greatly increased the number of readers of the *Aircraft Year Book* and secured more general dissemination of our current history of world-wide aeronautical development.

As a final word, we wish to express our great indebtedness to the members of the Aeronautical Chamber of Commerce of America, for their loyal support and co-operation, and to the entire executive staff of the New York office and the Washington Bureau for their splendid and constant help.

SAMUEL STEWART BRADLEY.

New York City,
February, 1928.

CHAPTER I

REVIEW OF AERONAUTICS IN THE UNITED STATES DURING 1927

"The technical improvement in the performance and efficiency of aircraft for all purposes, the policy of the Government in the regulation and encouragement of aviation, and the great impetus given to aeronautical development during the past year by the transoceanic flights of Lindbergh and others have combined to cause a broader recognition of the practicability of aircraft as a means of transportation that I believe is destined to play an ever increasing part in the advance of civilization."

CALVIN COOLIDGE.

December 8, 1927.

WE approach 1928 after a truly wonderful year of accomplishment. In review for the purpose of establishing the permanent record in the limited space available in the *Aircraft Year Book*, considerable difficulty is met due to the richness of the material found in the vast number of conspicuous events of the past twelve months, all of which are worthy of special recognition.

Those who have followed aeronautical progress through the nine previous editions of the *Aircraft Year Book* already know that it is necessary, in summing up for each year, to make a distinction—with a wide difference—between *development* and *accomplishment*. Development must be associated with and matched up against accomplishment in order to properly estimate progress, as all developments find their true meaning in the results to which they lead in action. Development is a composite thing, involving all growth from the beginning of time. Accomplishment is the final realization of certain definite objectives.

This year the objective which we have realized or gained is that most desired, difficult, long deferred and most precious thing—widespread public confidence. Most difficult, because it is a thing beyond human control; our most perplexing problems of engineering and operations have been nothing by comparison. Most precious, because without public confidence we cannot proceed with our program of putting aircraft to work. Therefore, to have the idea of the utilization of aircraft suddenly incorporated into the public consciousness as a normal human activity, as the most rapid and flexible means of transportation yet devised, is an accomplishment of such tremendous significance as to make the year 1927 of outstanding brilliance.

The possibility of human flight has fascinated men for ages. After its accomplishment, its true significance could be reached only

by a study of the results attained through its application. This took time. Step by step, it passed through the wonder stage, the romantic, spectacular, circus ballyhoo period, started on a short stretch of sporting events, and then went to war.

Since the war, the principal function of the Aeronautical Chamber of Commerce has been to promote the utilization of aircraft in transportation. This also has taken time. Development has been constant, and each year definite objectives were reached; and these accomplishments, duly recorded in previous *Aircraft Year Books*, have become part of our history.

As far back as 1919, three trans-Atlantic flights were successfully accomplished. Subsequently, American aircraft had won laurels through a truly wonderful series of exploits such as the flight Around-the-Rim of the United States; the flight of the fleet of planes from New York to Alaska and return; the Trans-Continental Non-Stop Flight; the Round-the-World Flight of three Army planes in 1924; the Dawn-to-Dusk Flight from New York to San Francisco; the North Pole Flights; the Good-Will Flight around South America, and other similar events of outstanding importance.

In addition to these remarkable accomplishments, equally noteworthy results had been attained in high speed, endurance and altitude records. In the practical application of aircraft to more speedy transportation, we had recorded the truly impressive performances of our air mail lines. Flying by night as well as by day in all kinds of weather, schedules had been maintained over 7,000 miles each twenty-four hours over most difficult terrain, crossing mountains, deserts, lakes, and forests.

These accomplishments had not gone unheralded. They had been duly appreciated by the press and the public and utilized as stepping stones for continued advancement. They marked the steady march of progress and paved the way for securing the long deferred but vital governmental recognition which came in 1926. During that year, aeronautics in the United States became permanently established upon a sound program of constructive legislation. Thus, as the year 1927 was ushered in, the stage was set for the next great step in our progress.

Prior to 1927, many intelligent, well-informed people continued to think of aviation as a stunt to be marvelled at, but not coming within the scope of practical everyday life. Comparatively few people thought of air transportation in terms of possible personal participation, or incorporated it into any scheme of normal human activity.

Aeronautical events had come so rapidly and were so frequently disassociated with practical application that the public, due partly to the technical nature of the subject, while very interested and enthusiastic, was on the whole apparently considerably bewildered as to what it was all about.

During the preceding year, as previously noted, Congress, after great deliberation due to the above and other causes, as recorded in the 1926 *Aircraft Year Book*, came to realize its responsibility. With the passage of the Air Commerce Act and the Five-Year Air Programs for the Army and the Navy, we were in a measure prepared for the events which followed.

We had, in addition to pilots and aircraft, the engineers, designers and manufacturers to carry on and secure the progressive development and perfection of all kinds of equipment. We had aerial transportation companies and aerial service operators in the field looking for business. We had the basic law giving legal authority for carrying on their work and for the assistance of the Government, through the Department of Commerce, in maintaining airways and aids to navigation. In fact we had about everything that could be desired except complete public recognition of flying as a practical means of transportation.

The year 1927 changed this. The flying events of that year supplemented the work which had gone before in such an admirable way, that in the twinkling of an eye, on May 21, 1927, Lindbergh, flying alone from New York to Paris, gripped the consciousness of the entire civilized world. Public recognition and confidence seemed to come in an instant. This result was the outstanding accomplishment in aeronautics during the year 1927.



COL. CHARLES A. LINDBERGH

San Diego to New York, May 10-13. New York to Paris, Trans-Atlantic, May 20-21. Three Months Tour of United States, July 20-October 23. Washington—Mexico City—Central America—Bogata—Virgin Islands—Porto Rico—Cuba—St. Louis, December 13, 1927, to February 13, 1928.

CHAPTER II

EPOCHAL FLIGHTS OF 1927

Lindbergh Flies Alone!

"Alone? Is he alone at whose right side rides Courage, with Skill within the cockpit and Faith upon the left? Does solitude surround the brave when Adventure leads the way and Ambition reads the dials? Is there no company with him for whom the air is cleft by Daring and the darkness is made light by Emprise? True, the fragile bodies of his fellows do not weigh down his plane; true, the fretful minds of weaker men are lacking from his crowded cabin; but as his airship keeps her course he holds communion with those rarer spirits that inspire to intrepidity and by their sustaining potency give strength to arm, resource to mind, content to soul. Alone? With what other companions would that man fly to whom the choice were given?"

—*New York Sun*, May 21, 1927.

Lindbergh Flies to Paris

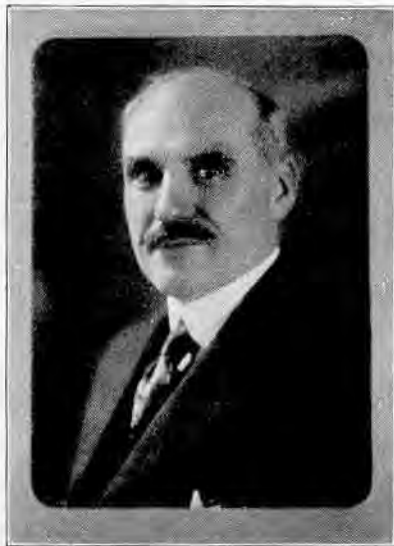
BETWEEN 7:53 o'clock on the morning of May 20 and 10:24 o'clock on the night of May 21, 1927, the Atlantic Ocean was crossed for the first time by a single person in an airplane, when Charles A. Lindbergh, American air mail pilot, soloed from New York to Paris in a non-stop flight of 3,610 miles in the elapsed time of 33 hours and 30 minutes.

Previously, he had been well and affectionately known to a comparatively small circle of intimates in the operating personnel of Army Air Service and the Air Mail. All that the rest of the world knew of him was that an intrepid airmail pilot, after graduating from the Army Flying School at Kelly Field, had entered the list for the Orteig prize of \$25,000 for the first non-stop flight from New York to Paris; that with the support of a small group of public spirited men in St. Louis, he was having a plane built on the Pacific Coast for the trip; and that his name was Charles A. Lindbergh. Then it was announced in the press dispatches that he had started on a single stop trans-continental flight from San Diego to New York to begin his trans-oceanic flight.

As if starting on a routine air mail trip, Lindbergh set out on May 9 from San Diego, California, for St. Louis, Missouri, his first objective, 1,600 miles distant. He left in the afternoon and flew all night, arriving in St. Louis on May 10, after a flight of 14 hours and 5 minutes. The next day he set out for New York, arriving at Curtiss Field in 7 hours and 15 minutes.

Around this flying center on Long Island were concentrated all the gossip, interest and most of the aeronautical activity in connection with preparations for the Orteig prize. At Curtiss Field others

had previously vainly prepared for flights to Paris. On May 9, thousands had there waited and hoped for the coming from Paris of Nungesser and Coli. Here, also, two other machines were being groomed with last minute touches, and waiting an improvement in the weather before taking off for Paris.



RAYMOND ORTEIG

Donor of \$25,000 Prize for the First
Non-Stop New York-Paris Flight.

It was into this field, teeming with excitement, that on the afternoon of May 12, Lindbergh's silver-winged monoplane came circling out of the sky and rolled to a stop near the other machines. A clean-cut young American, with a smile that the world now knows, leaned out of the cockpit and waved a greeting.

Until the silver plane, the *Spirit of St. Louis*, came down on Curtiss Field, and the quiet young aviator unobtrusively went about his work of getting ready for the hop across the Atlantic, the whole Lindbergh performance was almost without publicity, like a job that was to be done, whether the world knew of it or not. From that moment, however, the pub-

licity became spontaneous. It centered first around his almost unheralded trans-continental trip of 21 hours and 20 minutes flying time, and then around the unaffected simplicity with which he set about completing his plans. He had the sympathy and good-will of the public, but there was little confidence in his ability to fly alone and unaided the thirty or more hours which would be required to cross the ocean.

Lindbergh's Ryan monoplane has a wing spread of 46 feet and a gross weight of 5,000 pounds. It is equipped with a Wright air-cooled "Whirlwind" engine and a Pioneer earth-inductor compass. The plane and its equipment had been acquired through the moral and financial support of a small group of public spirited citizens of St. Louis. To these men, Harry H. Knight, Maj. William B. Robertson, Maj. Albert Bond Lambert, J. D. Wooster Lambert, Harold M. Bixby, Earl C. Thompson, Harry F. Knight and

E. Lansing Ray, is due grateful appreciation for having made Lindbergh's flight possible. Because of their participation, the plane was named the *Spirit of St. Louis*. This compliment to their beautiful city proved to be most fortunate and significant. The direct appeal of *l'Esprit de Saint Louis* upon the heart and mind of our much loved France can be imagined. This, like other features of the flight and its consequences, shows the constant presence of power and direction beyond the scope of human expectation.

Patently Lindbergh bided his time. All mechanical details had been attended to so thoroughly that beyond the installation of the earth-inductor compass, some adjustments of equipment, a little test flying and fueling, there was nothing to wait for except clearing of the weather over the Atlantic.

While studying the meteorological reports, all that he asked of the weather was a fair break, and this, according to his judgment, was finally at hand on Friday May 20, 1927, at 7:50 A. M. That morning Lindbergh took off from Roosevelt Field for Paris!

This twenty-five year old air-mail pilot, with courage and determination which thrilled the world, and fortified with only a few sandwiches, a bottle of water, a few hundred dollars and one or two letters of introduction to aviators in France, set out to conquer the Atlantic and succeeded in conquering the world.

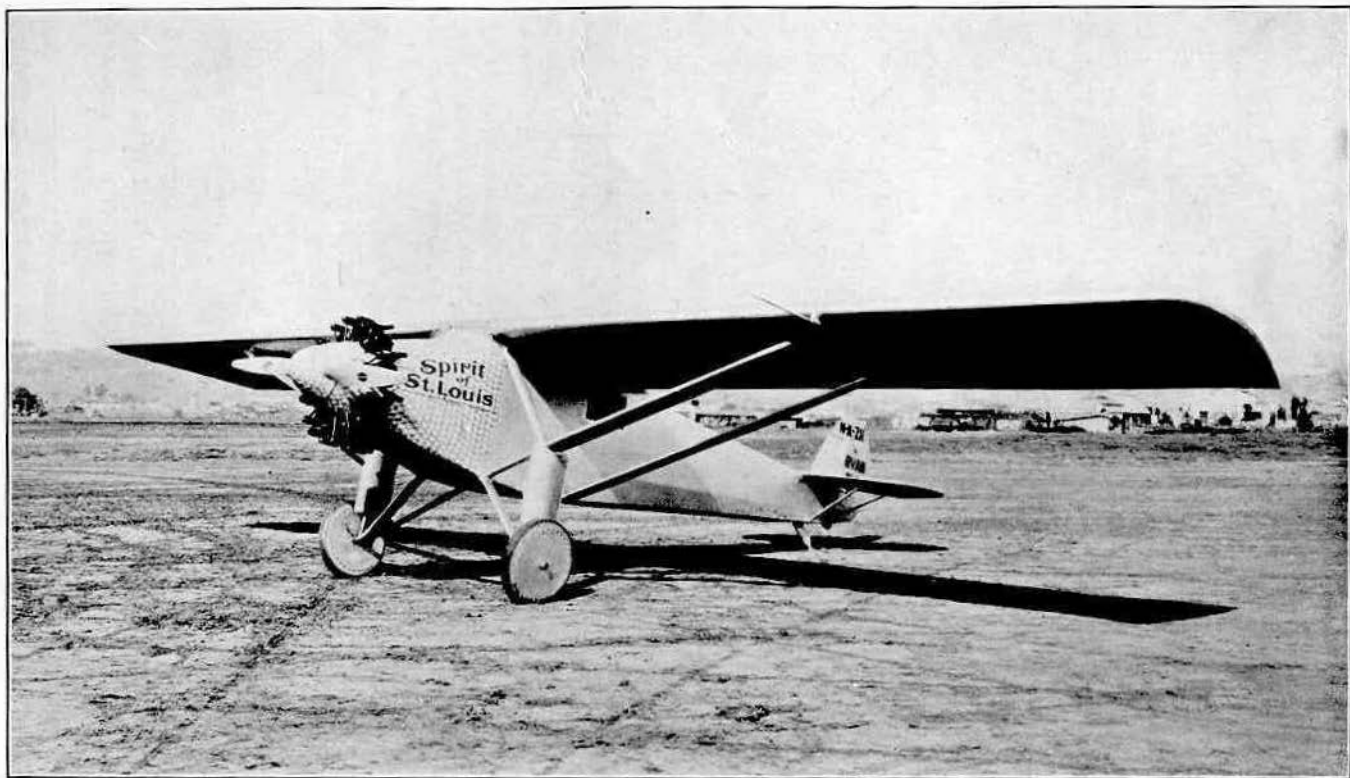
Flying by dead reckoning, he held his course and that evening circled St. Johns, Newfoundland, to get his bearings, and then headed across the Atlantic. While hundreds were on the lookout from vessels at sea and land stations, he was seen for the first time from a vessel when 500 miles off the coast of Ireland. On the evening of May 21, he passed over the coast line near Dingle Bay, within three miles of the point marked on his charted route, a masterful piece of navigation by compass and dead reckoning.

From the time he reached the Irish coast his progress was observed and reported many times until he arrived at Le Bourget Field, the airport of Paris, on Saturday evening, May 21, 1927, at 10:21 Paris time (5:21 New York time).

Smiling, he cried his greeting: "Well, we are here!" Since that moment "We" has had a new and special significance throughout the world.

More than 100,000 people awaited his arrival. At first incredulous, the crowd suddenly realizing his triumph, burst forth in such spontaneous enthusiasm that all barriers and control were overcome in a wild frenzy of admiration and joy.

The crowd at Le Bourget had gathered more from curiosity than from expectation of success. When first sighted, some one shouted,



Spirit of St. Louis.

"It's the plane from Strasbourg!" This seemed reasonable and the crowd accepted it as a fact. They could not believe their own eyes! When they saw that it was the *Spirit of St. Louis*, no words can adequately describe their excitement and joy.

One of the most beautiful, and at the same time significant, records of the events of that evening and of the following week, are the notes made by Major Weiss, one of France's great pilots. As Commanding Officer of French Military Aviation at Le Bourget, Major Weiss was the first Frenchman to welcome Lindbergh. They were together constantly until a week later, when Lindbergh left Paris for Brussels, on his way to England and home.

With the sympathetic artistry and instinctive forethought so characteristic of the French, this celebrated officer noted his impressions almost hourly. Even in translation his significant comments do not lose their beauty. His last entry breathes a profoundly human and fraternal spirit.

"Why farewell?

"Because this moment of union and joy which we have just lived through you, has flown with you . . . Your exploit is eternal, Lindbergh, but the fever of that night of waiting is not! Who will ever give it back to us?

"What is most delicious in these memories is that you have opened our eyes upon ourselves. We thought ourselves miserly in spirit, incapable of enthusiasm, rather blasé about everything, indifferent or worried. Your white apparition was sufficient—as in 1914 a call to arms was sufficient—to make the people of France again find that deep in its heart abides a constant longing for the infinite.

"That crowd which on May 21 covered the plain of Le Bourget certainly desired your success, but without conviction and without fervor. When your air eddies had passed, everything changed. At the sound of the unusual motor a gravity without equal seized the conscience. People stopped thinking and held their breath to hear the sound of that historic second, and the throng for a lightning moment, was an immense prayer.

"We bless you, Lindbergh, for having thus brought us together, for having shown us the pride of living, for making us shed tears at a beautiful deed.

"And then the following days you ascended higher, if it is possible! You passed sentence on that familiar error which opposes muscle against brain, action against spirit. The victor, the air athlete, the scaler of the ocean, was also a young sage.

"Having terminated your task, you mounted the tribune in the assemblies, and as simple, as modest, as free among the statesmen as at your pilot's post, you spoke in short, precise phrases, articulated very quietly—real lessons in measure, tact and judgment—in the midst of the delirium.

"You have power, Lindbergh, but you also have soul . . .

"And it is your soul which conquered the French soul that is dispersed in all of us—the French soul which has saved us so many times. For, know it well, you have set us in a state of grace. Those civilians who raised you on their shoulders were the red and blue soldiers of the Marne, the horizon-blue soldiers of Rheims and Douaumont. Those women who thrust their children toward you were the mothers and widows of the war, all the Calvary of the mother country. It was not Paris alone, but all our provinces; it was Alsace! And you had become suddenly, America drawing the sword, flying to the battlefield.

"Farewell, Lindbergh! The void frightens us as your fine profile disappears, but the spell is not broken. You remain for us the small ray of hope which makes the work lighter, the effort more voluntary, and life more like the dawn."

During the excitement following the arrival at Le Bourget, Lindbergh was rescued from the crowd and with his "letters of introduction" was taken to the Embassy of the United States, where he remained as the guest of Ambassador Herrick.

Homage and rejoicing were divided between acclaim of the great single-handed achievement and admiration for the splendid poise, modest character, skill and courage of the man.

On the second day after his arrival, May 23, the French Government through President Doumergue and Premier Poincaré, at a formal reception at the Elysée Palace, extended its highest honor when President Doumergue personally decorated him with the Cross of the Legion of Honor. This was followed by a reception at the Aero Club of France, where Paul Painlevé, Minister of War, presented the gold medal of the Aero Club of France.

In addition to messages of congratulation from the governments of all the countries of the world, numerous offers of fabulous sums were cabled by publicists wishing to capitalize his triumph. All of the latter Lindbergh firmly declined.

For three days, the French had Lindbergh to themselves, and then the Americans and other foreign residents of Paris tendered receptions at the American Club and at the Union Interalliée. On May 26, in a most spectacular demonstration, Lindbergh at the head

of a brilliant procession was driven through miles of streets and avenues crowded with hundreds of thousands of admiring Parisians to the Hotel de Ville, for the official reception on behalf of the City, by the President and Municipal Council, assisted by Marshal Foch and Marshal Joffre. Later he was tendered a luncheon by Foreign Minister Briand.

Of the many urgent invitations to visit foreign countries, it was possible to accept only two—Belgium and England. Accordingly, on Saturday, May 28, Lindbergh flew to Brussels, where a tremen-



Reception to Colonel Lindbergh at Paris.

dous crowd awaited. That afternoon, he was presented to King Albert, Queen Elizabeth and the court by Hon. James C. Dunn, Chargé d'Affaires of the American Embassy. King Albert, known as "the royal airman," talked "shop" for some ten minutes with the modest American, and then made him Chevalier of the Royal Order of Leopold.

The following day he continued his flight to England, landing at Croydon. Here the scenes of riotous rejoicing rivaled those of the preceding week at Le Bourget. As the silver-winged plane came into sight, the joyous acclaim broke all bounds of restraint. The cordon of 1,200 police was swept aside, and it was some time before space could be cleared for a safe landing. The magnitude and



Reception to Colonel Lindbergh at Brussels.



Reception to Colonel Lindbergh at Croydon Field, London.

spontaneity of Lindbergh's reception at Croydon was a revelation to America of the depth to which the emotions of all people had been stirred.

On May 31, Lindbergh was received at Buckingham Palace by King George and Queen Mary. The king, setting aside all precedent, personally bestowed upon the flyer the rare Air Force Cross, an honor only once before bestowed upon American aviators—the crew of the NC-4 on their first successful crossing of the Atlantic.

He was also presented to the Prince of Wales and Prime Minister Baldwin, and hospitably feted by Winston Churchill, Chancellor of the Exchequer; Sir Samuel Hoare, head of the British Air Ministry, and Sir Hugh Trenchard, Air Chief Marshal. He attended the races at Derby, and was a guest at the Derby Eve Ball with the Prince of Wales.

In the meantime, arrangements were being made in the United States for Lindbergh's homecoming. At President Coolidge's order, the U. S. Cruiser "Memphis" awaited him at Cherbourg. Lindbergh flew from London to Paris for a farewell visit, and the *Spirit of St. Louis* was crated for its home voyage. He then, on June 4, flew in a French plane from Paris to embark upon the "Memphis," which cleared Cherbourg on that day, commanded by Vice Admiral Burrage. The vessel arrived off the Virginia Capes on June 10, and proceeding up the Potomac, anchored for the night.

On Saturday morning, June 11, the "Memphis" arrived at the Washington Navy Yard. Awaiting the cruiser were Secretary Wilbur of the Navy and Secretary Davis of the War Department, Postmaster General Harry S. New, former Secretary of State Charles E. Hughes, the three Assistant Secretaries for Aviation F. Trubee Davison, E. P. Warner and W. P. MacCracken, Jr.; Admiral Edward W. Eberle, Chief of Operations for the Navy; Maj. Gen. Mason M. Patrick, Chief of the Air Corps, and Rear Admiral William A. Moffett, Chief of the Bureau of Aeronautics. With this group of officials were Mrs. Evangeline Land Lindbergh, the flyer's mother, and Capt. E. S. Land, U. S. N., a cousin.

Proceeding through the city to the Washington Monument at the head of a colorful procession, in which all the military branches of the Government were represented, Lindbergh was hailed with wild joy and enthusiasm. At the Monument grounds a crowd of more than 150,000 persons awaited him. Here Lindbergh and his mother were received by President and Mrs. Coolidge, the Cabinet, the Diplomatic Corps, and other national leaders.

President Coolidge, in the course of a heartfelt speech of welcome, following the presentation of the Distinguished Flying

Cross and a commission of Colonel in the Army Reserve Corps, said:

"Our messenger of peace and good-will has broken down another barrier of time and space and brought two great peoples into closer communion. In less than a day and a half he has crossed the ocean over which Columbus had traveled for sixty-nine days, and the Pilgrim Fathers for sixty-six days on their way to the New World.

"But, above all, in showering applause and honors upon this genial, modest American youth, with the naturalness, the simplicity and the poise of true greatness, France had the opportunity to show clearly her good-will for America and our people.

"With like acclaim and evidences of cordial friendship our ambassador without portfolio was received by the rulers, the governments and the peoples of England and Belgium. From other nations came hearty messages of admiration for him and for his country. For these manifold evidences of friendship we are profoundly grateful.

"The absence of self-acclaim, the refusal to become commercialized, which has marked the conduct of this sincere and genuine exemplar of fine and noble virtues has endeared him to everyone. He has returned unspoiled."

Thus came to his own people this modest young aviator, who three weeks before had been known only in the small circle of his aviation activities, but whose indomitable spirit, skill, courage and splendid character have won the abiding affection and admiration of the entire world.

After the welcome to Colonel Lindbergh at Washington, the people in various states demanded an opportunity to pay their tribute. There followed a remarkable series of welcomes beginning at New York, where his trans-oceanic flight started, to St. Louis, whose public-spirited citizens made the adventure possible, and then on to the Pacific Coast, where his plane was built.

The outstanding reception for magnitude, spectacular impressiveness and spontaneity was that of New York City on June 13. Flying from Washington in an army plane to Mitchel Field on Long Island, he transferred to a Loening amphibian plane, and accompanied by Capt. Ira C. Eaker of the Army Air Corps landed twenty minutes later in New York Harbor where he boarded the "Macom," the municipal reception boat, which bore the Mayor's welcoming committee, with Grover A. Whalen at its head.

Hundreds of ships, from flag-bedecked excursion boats and ocean liners to humble harbor tugs, gathered around the "Macom" and



Harbor Craft escorting Colonel Lindbergh on his return to New York after the Paris flight.

formed the most spectacular marine procession ever seen in New York Harbor. Arriving at the Battery, the largest military escort ever accorded a private citizen accompanied Colonel Lindbergh to the City Hall. The sidewalks and the towering buildings along the line of the parade to the City Hall, the full length of Fifth Avenue, and Central Park were jammed by a good-natured and wildly enthusiastic multitude, estimated at 4,000,000 people.

The ceremonies in New York consisted of presenting to Colonel Lindbergh the city's Scroll of Welcome and bestowing the New York State Medal of Valor; while the festivities, in addition to a



Aeronautical Chamber of Commerce of America Banquet in honor of Col. Charles A. Lindbergh, Waldorf Astoria, New York, June 16, 1927.

breakfast by Raymond Orteig, donor of the \$25,000 prize for the New York-Paris flight, included two notable banquets. The first, tendered by the City of New York at the Hotel Commodore, assembled 3,700 distinguished guests; and the toastmaster, Mayor James J. Walker, Hon. Alfred E. Smith, Governor of the State, Hon. Charles E. Hughes and other national figures delivered the greetings of the Empire State.

The second banquet was the tribute of American aviation by the Aeronautical Chamber of Commerce of America at the Waldorf. Fourteen hundred men who had won distinction in aviation, or who had contributed in some important way to its progress, and their

guests attended the dinner on June 16. A crowd of thousands of cheering citizens gathered in the vicinity to greet Colonel Lindbergh as he arrived at the hotel.

This banquet, due to the character of its speakers, the spirit of enthusiasm and the tenor of the speeches, was a most brilliant and memorable event.

Col. Paul Henderson, President of Aeronautical Chamber of Commerce of America, was toastmaster. Mr. Charles M. Schwab, in recognition of his leadership, had been chosen to give the address

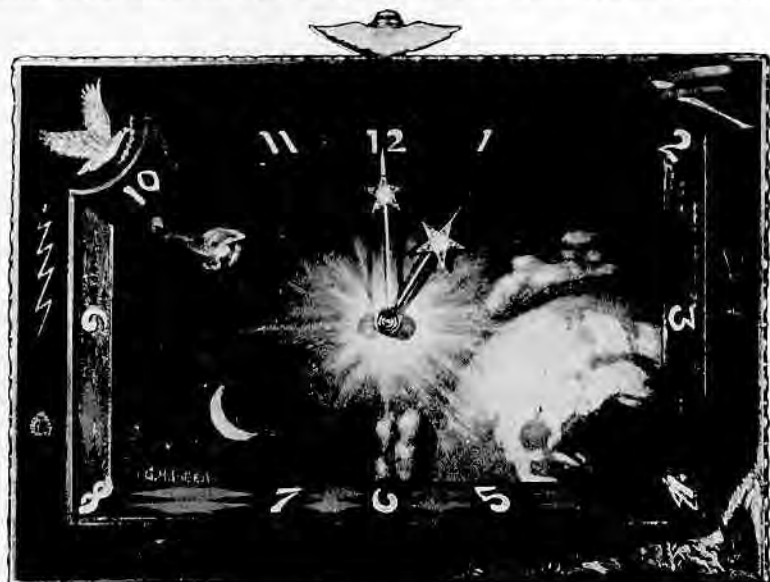


"By Arduous Ways to the Stars."

Gold Medal presented by Aeronautical Chamber of Commerce to Col. Charles A. Lindbergh, commemorating his New York-Paris flight.

of welcome on behalf of all American industry. The tribute of the great steel master to aviation and its young exemplar was most impressive and appropriate. Colonel Henderson on behalf of the Chamber presented to Colonel Lindbergh a solid gold plaque, from the design of the talented sculptor, John Gregory, bearing the inscription *Per aspera ad astra*, "By arduous ways to the stars," and on the reverse, the inscription, "Commemorating the first non-stop New York to Paris flight by Col. Charles A. Lindbergh May 20-21, 1927." Replicas of the plaque were presented to the dinner guests. A beautiful, specially designed clock, the gift of the Aeronautical Chamber of Commerce to Mrs. Lindbergh, was also presented to her son.

Among the guests of honor at the speaker's table with Colonel Henderson were F. Trubee Davison, Assistant Secretary of War; W. Irving Glover, Assistant Postmaster General; Edward P. Warner, Assistant Secretary of the Navy; William P. MacCracken, Jr., Assistant Secretary of Commerce; M. Mongendre, French Consul General; Grover A. Whalen; Raymond Orteig, donor of the \$25,000 prize for the New York-Paris flight; Col. B. D. Foulois and Col. T. A. Baldwin, Air Corps, U. S. A.; Com. Richard E. Byrd,



Jeweled Aviation Clock presented by Aeronautical Chamber of Commerce to Mrs. Evangeline Lindbergh.

U. S. N., of North Pole fame; Capt. E. S. Land, U. S. N., a cousin of Lindbergh and Assistant Chief of the Navy Bureau of Aeronautics; Capt. H. C. Richardson, who participated in the Navy's flight over the Atlantic in 1919; Lieut. Leigh Wade of the Army Round-the-World-Flight of 1924; Charles L. Lawrance, designer of the "Whirlwind" motor; Donald Hall, designer of the *Spirit of St. Louis*; M. M. Titterington, designer of the "Pioneer" earth-inductor compass; Glenn H. Curtiss, pioneer flyer and celebrated aeronautical engineer; Porter Adams, President, National Aeronautic Association; Harry F. Guggenheim, of the Daniel Guggenheim Fund for the Promotion of Aeronautics; John Gregory, sculptor; and Maj. W. F. Deegan, American Legion.

Such is the Lindbergh saga.

The modest hero, with his letters of introduction to Paris, never dreamed of the tremendous consequences of his triumph.

The mellowing influence on international comity of national sympathy following great calamities, had been frequently observed; but few, if any, had considered the potentialities for general goodwill and spiritual exaltation in the poetic appeal of a deed of true sportsmanship and daring.

In the great rejoicing of the people of the entire civilized world, there came a feeling of profound personal satisfaction and conviction which hushed the critics who are wont to emphasize our vulgarity, materialism and lack of spiritual feeling, and impressed the fact that we are not entirely given over to self-indulgence; nor completely under the yoke of the devastating practice of moral compromise, and willing to barter our souls for cheap creature comforts. And it was doubly reassuring because it was the result of the achievement of a mere youth. We were becoming accustomed to certain pessimists who held that the present generation was not promising in hope for the future. Undoubtedly, when in response to a generous, princely impulse, a prize for the first non-stop flight from New York to Paris was offered, Raymond Orteig had a vision of its effect on international comity and the advancement of aeronautics, but it is not probable that he or anyone could have had any adequate appreciation of the spiritual stimulus it has given to the younger generation. The latter, however, must be and is recognized as one of its greatest results. The world owes a large debt of gratitude to Raymond Orteig.

Much was said and written about the flight itself and about the young American who made it, and it was all epitomized by President Coolidge in this simple tribute: "The absence of self-acclaim, the refusal to become commercialized, which has marked the conduct of this sincere and genuine exemplar of fine and noble virtues, has endeared him to everyone. He has returned unspoiled."

But high above the personal tribute and the glamor of the deed there constantly arose at home and abroad, gratification over the increased spirit of good-will between two great nations. The airplane was its vehicle.

Other Trans-Oceanic Flights

As previously noted in this volume, the first flights over the Atlantic were made in 1919.

All those who have followed aeronautical development knew that Lindbergh and the other successful pilots, whose exploits soon



Wright-Bellanca flown by Chamberlin to Germany. Engine, Wright "Whirlwind."

followed, were not the first to make successful trans-oceanic flights. They carried development farther, with the improved equipment that marked the progress made by the aeronautical industry, since the earlier ocean flights.

For that reason particular satisfaction was felt in aviation circles, when, even before Lindbergh reached home, a series of trans-oceanic flights started which kept up and intensified public interest. As a result, as also previously noted, an apathetic and detached public, not only in the United States but throughout the world, came to realize the practicability and value of aerial transportation.

Chamberlin Flies from New York to Germany

The year 1927, the banner year in the history of trans-oceanic flight, reached its peak on June 29. On that day, two American airplanes with six American engines were making their way over the Atlantic and the Pacific, one eastward to France and the other westward to Hawaii.

This month, which stands out so strikingly in history, opened auspiciously on June 4 with the record-breaking flight of Clarence Chamberlin, pilot, and Charles A. Levine, passenger and owner, of a Wright-Bellanca plane, the *Columbia*, powered with a 200 H. P. Wright "Whirlwind" engine.

The flight began on Long Island at 6:05 A. M. June 4, and ended at Eisleben, Germany (108 miles from Berlin) on June 6 at 7 A.M. Berlin time (12:50 A.M. Eastern Standard time). It constituted a non-stop performance of 3,905 air line miles flown in 42 hours and 45 minutes, setting a world's record for uninterrupted long distance flight.

Chamberlin's achievement was the second trans-Atlantic crossing in a fortnight by an American pilot with American equipment. Following so closely the Lindbergh flight, the arrival of the *Columbia* in Germany strengthened still further confidence throughout the world in American aircraft and gave added



CLARENCE D. CHAMBERLIN

impetus to the awakening of public interest in commercial aviation.

The Chamberlin-Levine non-stop flight ended at Eisleben on June 6, but on the next day the *Columbia* was flown to Berlin. A crowd of 150,000 persons waited at Tempelhofer Field, and gave

a rousing reception. The American flag was run up on the main flagstaff of the aerodrome, and the bands played the "Star Spangled Banner." Hon. Jacob G. Schurman, the American Ambassador, formally greeted the flyers. President Hindenburg and Chancellor Marx each tendered the flyers a reception. Among the other functions were a luncheon by Foreign Minister Stresemann, and a dinner by the municipal authorities at the City Hall. From Berlin, Chamberlin and Levine flew to other cities and finally to Paris where further honors were accorded them.



CHARLES A. LEVINE

They were in the city when the Parisians paid homage to Commander Byrd and his crew, and were included in the various brilliant receptions given by the French in honor of the American flyers.

First Flight to Hawaii

Lieutenants Maitland and Hegenberger

The Atlantic having been crossed twice in a fortnight, interest began to shift to the hitherto unbeaten Pacific. The first failure in 1925 to fly from California to Hawaii served as an incentive to renewed endeavors. Various prizes were offered, among them sums of \$25,000 and \$10,000, respectively, by James D. Dole of Honolulu, for the first and second uninterrupted flights from the mainland of the United States to Hawaii. There were many entrants for the Dole prizes, but before any of the contestants got under way the Air Corps of the Army achieved this feat in the course of carrying out a service test of newly developed navigational instruments and methods.

The Army flight was begun June 28 at Oakland, California, and was successfully completed on Wheeler Field, near Honolulu, on the

morning of June 29th, by Lieutenants Lester J. Maitland and Albert F. Hegenberger, after being in the air 25 hours and 50 minutes, and covering, in uninterrupted flight, 2,400 miles of open ocean.

The equipment consisted of a tri-motored Fokker, driven by three air-cooled Wright "Whirlwind" engines, each of 200 H. P. at 1,600 revolutions. It carried the most advanced navigational equipment available. With the plane and equipment thoroughly tested at Wright Field, Dayton, Ohio, and on the flight to San Francisco, the aviators were ready for the trip.

The start was made from the Municipal Airport at Oakland, California, on June 28, at 7:09 A. M. after a final inspection of the equipment and arrangements by Major General Patrick, Chief of the Air Corps. On the long journey one steamship was sighted and another, 400 miles distant, was communicated with by wireless. With the aid of the radio beacon and the use of the

sextant, the plane was held on its course. This most remarkable flight not only set a record in uninterrupted ocean flight, but it demonstrated the value of the radio beacon "beam" for checking a flight course, a development of importance also for commercial aviation. The splendid navigation displayed by these two pilots in striking, at the end of a 2,400 mile flight over the ocean, the small island in mid-Pacific which constituted their goal, won wide admiration, while the cumulative effect on the public mind of a third successful trans-oceanic achievement in five weeks was far-reaching.

Hawaii received its first non-stop aerial visitors with joyous welcome. The hospitality of the people found expression in public ovations and social functions.

Lieutenants Maitland and Hegenberger arrived in San Francisco July 12 by steamer and were received with a demonstration of cordiality and enthusiasm that exceeded any welcome in the history of the city. At Washington the flyers were greeted on landing at Bolling Field by Secretary of State Kellogg, Secretary Wilbur of the Navy, Assistant Secretary of War F. Trubee Davison,



LIEUT. LESTER J. MAITLAND
U. S. Army Air Corps.

Assistant Secretary of the Navy E. P. Warner, General Pershing, Gen. Mason M. Patrick, Admiral W. A. Moffett and other high officials of the Federal Government. In the official party were also Charles L. Lawrance, designer of the "Whirlwind" motor, and Anthony H. G. Fokker, designer of the plane that carried the two



LIEUT. ALBERT F. HEGENBERGER
U. S. Army Air Corps.

flyers to their destination. Maitland and Hegenberger received from Assistant Secretary Davison of the War Department certificates of citation for the Distinguished Flying Cross, which were officially presented on September 29 by President Coolidge at his vacation lodge in the Black Hills of South Dakota. They also received the gold medal of the National Aeronautic Association. In New York the two flyers who had pioneered across the Pacific to Hawaii were tendered a luncheon at the Waldorf by the Aeronautical Chamber of Commerce. Grover Loening

was toastmaster, and Frank H. Russell, speaking on behalf of the industry, greeted the flyers with a word of welcome and congratulation. Among the other speakers was Maj. Gen. James Fechet, Chief of the Air Corps, who came from Washington to attend this function. A feature of the luncheon was the presence of Commander Byrd and other distinguished aviators who had earned world fame by their recent achievements in aerial exploration. Milwaukee, the home of Lieutenant Maitland, and Boston, the home of Lieutenant Hegenberger, among other cities, gave these two distinguished army aviators ovations befitting their achievements.

Commander Byrd's Flight to France

On the morning of June 29 at 5:25 A. M., Western Standard time, while Maitland and Hegenberger were still over the Pacific, steadily driving on towards their objective in the Hawaiian Islands, Commander Richard E. Byrd, U. S. Navy, and his crew, comprising

Bert Acosta, Bernt Balchen and Flight Engineer George W. Noville, took off from Roosevelt Field for Paris.

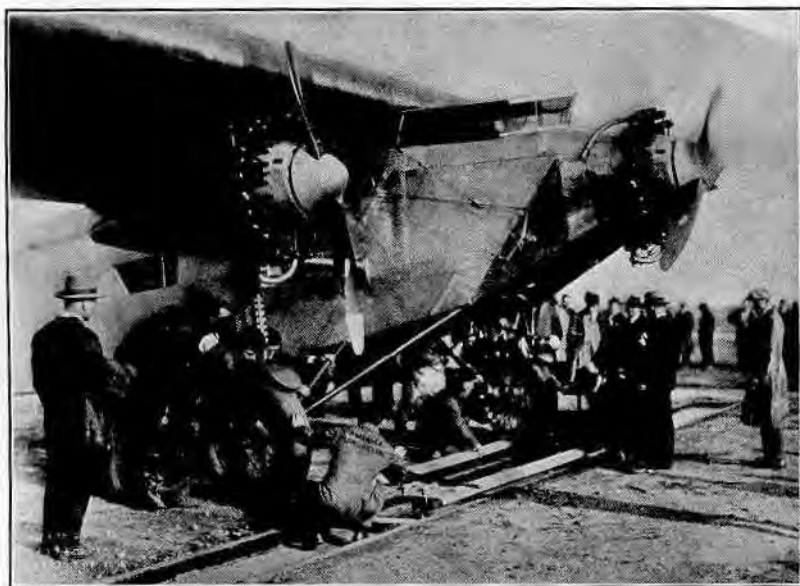
Commander Byrd had previously won undying fame by his flight from Spitzbergen to the North Pole and return in 1926. This honor and his skill as a navigator together with his great personal charm and dauntless courage gave the Byrd expedition, financed by Mr. Rodman Wanamaker, great popular as well as scientific interest. It was made in a tri-motored Fokker land plane, the *America*, essentially similar to the Army plane which was at that moment nearing a successful completion of its trip to Honolulu. The motive power consisted of three Wright "Whirlwind" engines of 200 H. P. The expedition sought not only to make a "good-will" flight to France, but also to accumulate meteorological and navigational data to serve in the development of future commercial trans-oceanic operations. It was a carefully worked out expedition and the high qualifications of Commander Byrd and his aides gave every assurance of its success.



COMMANDER RICHARD E. BYRD

The flight demonstrated that there was great need for the preparations made and the skill represented in the personnel, for there was an endless battle with the elements, beginning with heavy fog banks off Newfoundland and ending with a ceaseless downpour in the black night over France, which made a safe descent on land impossible. The expedition after passing Brest cruised for hours over France, unable to obtain exact bearings due to the darkness and the terrific storm, until shortage of fuel became a menace. In this situation Commander Byrd ordered a return to the sea coast where the plane might be beached within safe reach of the shore. At 2:30 on the morning of July 1, a glimmer from the lighthouse at Ver-sur-Mer, on the north coast of France near Trouville, pointed the way and the plane was set down in the surf at the end of 42 hours and 6 minutes in the air. The airline distance from Roosevelt Field to Ver-sur-Mer is 3,477 miles, but Commander Byrd estimated the distance actually flown at 4,200 miles.

The enthusiasm of the Parisians on the arrival of Byrd and his crew was not less fervent than that with which they had welcomed Lindbergh. The railroad station and the streets surrounding were jammed with an immense cheering crowd which was not appeased until Commander Byrd made a brief speech. The flyers were loaded down with honors and feted for days. Premier Poincaré bestowed upon Commander Byrd the rosette of the Legion of Honor. On July 7, the entire crew of the *America*, together with Chamberlin



Fokker Trimotored *America* used by Commander Byrd in flight to France. Engine, Wright "Whirlwind."

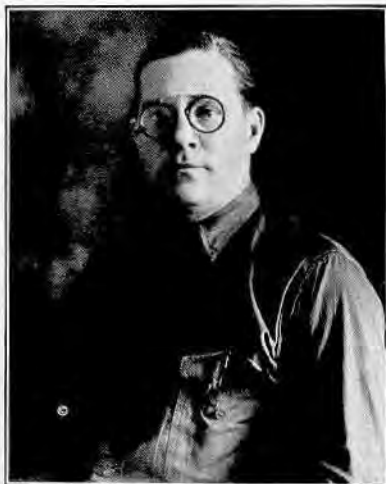
and Levine, were received at the Hotel de Ville, where each of the aviators was presented with a gold medal specially designed in honor of their respective flights. At the Union Interalliée the aviators were guests of honor at a reception by the Paris Chapter of the National Aeronautic Association, and were recipients of commemorative medals at the hands of Marshal Foch.

There was an impressive homecoming reception in New York on July 18 to Commander Byrd and his colleagues, and to Clarence Chamberlin, who returned to the United States with them. The flyers were greeted by the harbor fleet and enthusiastically received by great crowds in the streets along the line of march to the City

Hall. Here Mayor Walker and city notables received them and presented each with the Scroll of Welcome, and the city's Medal of



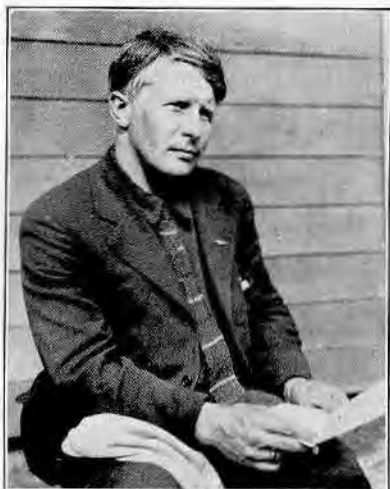
BERT ACOSTA



GEORGE W. NOVILLE

Valor. The receptions to Byrd, Noville, Acosta, Balchen and Chamberlin extended over four days, during which they were guests at luncheons given by the Merchants Association and other organizations of the city.

The results of the Byrd expedition were received as a valuable contribution to trans-oceanic aviation in demonstrating what can be accomplished under most adverse conditions, and what remains to be achieved for practical air traffic between the two hemispheres. Incidentally, more laurels were added to the high appraisalment that the world had already given to American airmen and the American aircraft industry.



BERNT BALCHEN

Three More Flights to Hawaii Smith and Bronte

During the month of July, the stretch of ocean between California and the Hawaiian Islands was again successfully covered by Ernest L. Smith and Emory B. Bronte, who flew from Oakland, California, to the island of Molokai, Hawaii, a fortnight after Maitland and Hegenberger landed at Honolulu. The Smith-Bronte trip was made in 25 hours and 36 minutes, and covered 2,340 miles airline. They flew a Travel Air monoplane, the *City of Oakland*, powered with a 200 H. P. Wright "Whirlwind" engine. The plane



EMORY BRONTE



ERNEST L. SMITH

had a 47 foot wing spread, and at the take off had a gross load of 5,000 pounds.

"Fog under us all the way. We never saw the ocean until our destination," is the way Smith summed up the trip. There was no trouble until near the end when the feed line became clogged and the plane began to lose altitude alarmingly, until the engine picked up again. In the meantime, an SOS had been sent out by radio, and this call, not being cancelled, started naval vessels on a long search for the plane that was thought to have settled on the water.

On the morning of July 15, the island of Molokai was sighted. There was just enough gas in the tank to reach land. There

being no clear space available for landing, the plane was set down in the brush and wrecked. The aviators came through unhurt, but only the engine and the instruments on the dash board could be salvaged.

**Arthur Goebel and William Davis
Martin Jensen and Paul Schluter**

Two more successful flights across the Pacific from the American mainland to Hawaii were soon made. This was on August 16-17, when the entrants in the Dole race got away. The winners were Arthur Goebel, with William Davis as navigator, who flew from



ART GOEBEL



LIEUT. WILLIAM DAVIS, JR.

Oakland, California, to Wheeler Field, near Honolulu, in 25 hours and 17 minutes, and Martin Jensen, with Paul Schluter as navigator, who came in second, covering the same stretch in 28 hours and 16 minutes. Goebel and Davis flew a Travel Air, and Jensen and Schluter a Breese monoplane. Both planes were powered with single Wright "Whirlwind" engines. The visibility was poor and one of the planes had great difficulty in rising above cloud and fog banks.

There were fourteen entrants in the Dole race. Eight planes crossed the starting line; four turned back; two were lost at sea; two reached the goal. Notwithstanding the splendid achievement of two single-motored airplanes winging their way independently

over 2,400 miles of open water, and arriving on the same field, within about two hours of each other, the race aroused severe criticism throughout the country. The event was marked by unnecessary crashes and loss of life, due in part to the fact that the race encouraged a mad scramble to win the prize money, in some instances without proper preparations and without regard for the fitness of the equipment. When it is recalled with what care Lindbergh, Chamberlin, Byrd, Maitland, and other successful trans-oceanic flyers went about their preparations, and to what constant testing



MARTIN JENSEN and PAUL SCHLUTER

their flying equipment was being subjected, a statement made by Martin Jensen, winner of second place in the race, throws an interesting light on the rush and hurry attending the start of this hazardous undertaking. Jensen wrote:

"Five days before the start of the race, not even the fuselage was on my plane, but in those five days I worked night and day, making preparation, always against great odds."

The storm of criticism against ill-considered ocean flights, under conditions of insufficient preparation, and possibly inadequate equipment, will have a steadying effect, it is believed, in all future attempts in this field.

From Detroit to Tokio via Europe

The series of epochal flights of 1927 came to an end in a blaze of glory with the airplane tour of Edward S. Schlee, a Detroit business man, and his pilot, William Brock, who flew from Detroit to Tokio. This flight differed from all other long distance ventures of the air in its purpose and in its execution. It was planned to demonstrate the practical possibilities of girdling the world in a single-motored airplane without advance work of preparing landing



WILLIAM S. BROCK



EDWARD F. SCHLEE

fields or storing supplies, and incidentally, bettering the round the world record of 28½ days.

The flight started, officially, from Harbor Grace, Newfoundland, on August 28, and ended at Tokio, Japan, on September 14, a distance of 12,295 miles in 18 days, including all delays. Actually, the flight began at Detroit, the trip to New York being made in six hours. From New York, after preparing for the trans-Atlantic hop, the two men flew to Newfoundland, where they awaited improvement in the weather over the Atlantic. The flights across the ocean, over Europe and Asia to Japan were accomplished without mishap and created the greatest interest. In deference to a general sentiment against their attempt to fly across the Pacific from Japan, with Midway Island, a tiny speck in the ocean, as the first fueling stop, these brave, resourceful men gave up the plan of completing

the circling of the globe, and concluded at Tokio their splendidly executed air journey.

The trip from Newfoundland and to London was made in 23 hours and 9 minutes, through rain, fog, and conflicting winds. In India the flyers ran into a monsoon. In Japan, they were caught in a typhoon that devastated the country and drove them out of the sky, back to their starting point to await the abating of the hurricane. Messrs. Schlee and Brock were highly praised for their splendid work, but the greatest praise of all came to them for their decision



Stinson Monoplane flown by Schlee and Brock, Detroit to Tokio.
Engine, Wright "Whirlwind."

to bow to the judgment of the best informed minds, that a successful flight from Japan to Hawaii was practically impossible due to lack of navigational aids, and without co-operation from land and sea, which was not available. It was hailed as a sane interlude in a succession of disastrous ventures that flaunted reason and experience, and paid the penalty.

New York-Azores Haldeman-Elder Flight

George W. Haldeman with Ruth Elder as co-pilot started to fly to Paris. Miss Elder hoped to be the first woman to cross the Atlantic. The European mainland was not reached on account of a

broken oil line. After a 28 hour battle with fog and winds, the two pilots decided to make a landing at sea, close to the Dutch tank ship "Barendrecht," 360 miles northeast of the island of Teceira in the Azores. This undertaking, in spite of its misadventure, was one of the outstanding oceanic air voyages of the year, being the longest flight made by an airplane over water. The distance was 2,623 statute miles, or 229.7 statute miles longer than the distance from San Francisco to the Hawaiian Islands.

The flight was made with a "Stinson-Detroitier," powered with a Wright "Whirlwind" engine. The take-off was made at 5 :04 P. M.



GEORGE HALDEMAN



RUTH ELDER

on October 11th from Roosevelt Field, with Capt. George W. Haldeman at the controls, and the landing was made at approximately 7:45 A. M., October 13. During this flight, Miss Elder was at the controls for about nine hours.

In the attempt to raise the plane to the deck of the tanker, after safely landing at sea, it caught fire and was destroyed. The "Barendrecht" carried the two fliers to Horta in the Azores, where they were cordially and enthusiastically received. They sailed to Lisbon, where the American Minister, Hon. Fred Morris Dearing, and Portuguese officials escorted them to the Government Palace where President Carmona of Portugal congratulated them.

From Lisbon Miss Elder and Captain Haldeman flew to Paris in a commercial plane, stopping en route at Madrid where the



TRANSOCEANIC FLYERS AT THE WHITE HOUSE.

(From left to right) Lieut. Lester J. Maitland, Clarence D. Chamberlin, Arthur C. Goebel, Col. Charles A. Lindbergh, Ruth Elder, Paul Schluter, Emory Bronte, Lieut. Albert Hegenberger, Lieut. George Noville, Commander Richard E. Byrd, George Haldeman, Charles A. Levine, Bernt Balchen, William S. Brock and Edward H. Schlee.

American ambassador Ogden H. Hammond and the Embassy Staff received them and held a brief reception in their honor.

At Paris, an enthusiastic and chivalrous reception awaited their arrival at Le Bourget on October 28. This was followed by many entertainments, official and social, until November 5, when Captain



Pilots and Route of Pan-American Good-Will Flight.

Haldeman and Miss Elder left Paris to sail on the "Aquitania" from Cherbourg for New York. Arriving at New York on November 11, they were met by Mayor Walker's reception committee and escorted to the City Hall, where they were received by Mayor Walker and presented with the Scroll of Welcome on behalf of the City.

On November 13, Lindbergh, Chamberlin, Levine, Maitland, Hegenberger, Byrd, Balchen, Bronte, Goebel, Schluter, Brock, Schlee, Elder and Haldeman were guests at a luncheon at the White House given in their honor by President Coolidge.

The Pan-American Flight

All of the outstanding American flights in 1927, however, were not across the oceans. In the month of May and just before Lindbergh's flight, the Pan-American "Good-Will Flight" around South America by the Army Air Corps as part of its extensive cross country flying and courtesy visits to neighboring nations was concluded.

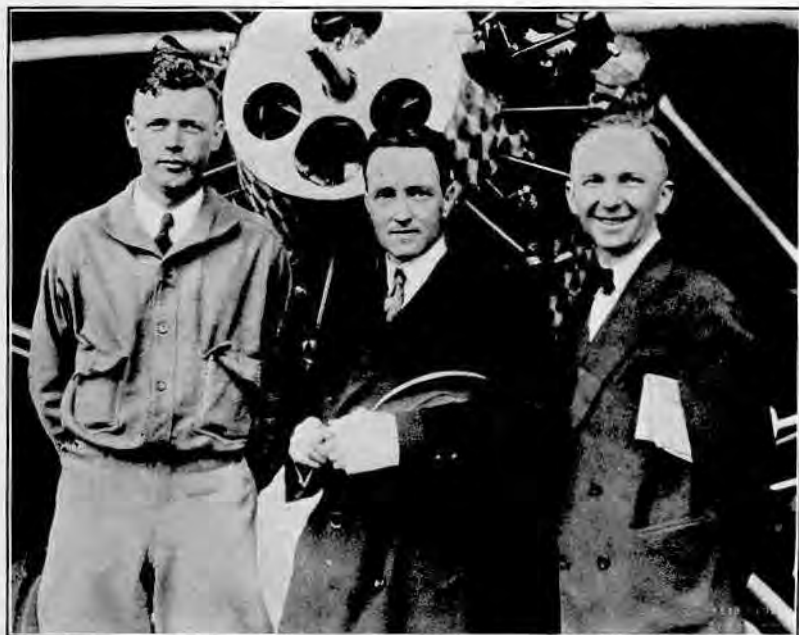
The expedition comprised five Loening amphibians equipped with inverted Liberty engines. The flight under command of Maj. H. A. Dargue, Air Corps, U. S. A., started from Kelly Field, San Antonio, Texas, on December 21, 1926, and ended at Bolling Field, Washington, D. C., on May 2, 1927. Twenty-five foreign nations and colonies in North, Central and South America were visited, the point farthest south being Valdivia, Chile, about 40 degrees south latitude. The Andes were successfully crossed, and there were long stretches of flying over open sea as well as over tropical jungles. The expedition gave a splendid account of itself, and again demonstrated the utility of the amphibian type of plane in negotiating such diversified terrain of land, sea, mountains and swamps as was encountered in the Pan American flight. There were many landings and take-offs on both land and water, and the crossing of a number of high mountain ranges which proved the value of the amphibian under all kinds of difficult flying conditions.

Three of the original five planes completed the journey of 20,470 miles. Two, the *New York* and *Detroit*, were destroyed in a collision in the air near Buenos Aires, Argentina, and two splendid pilots, Capt. C. F. Woolsey and First Lieut. John W. Benton, lost their lives in the accident. Maj. Herbert A. Dargue, the leader of the expedition, and Lieut. E. C. Whitehead jumped to safety with their parachutes.

The returning pilots on landing at Bolling Field, Washington, D. C., at the opening of the Pan-American Air Commission Confer-

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MAY 11 1927
NAVY DEPARTMENT

ences and the All America Aircraft Aircraft Display of the Aeronautical Chamber of Commerce were received by President Coolidge, members of the Cabinet, and diplomatic representatives of all the countries visited. Each pilot who had participated in the memorable flight was decorated with the Distinguished Flying Cross. Those so honored were, Maj. Herbert A. Dargue, Capts. Arthur R. McDaniel and Ira C. Eaker, and First Lieuts. E. A. Whitehead, Charles McK. Robinson, M. S. Fairchild, B. S. Thompson and L. D. Weddington.



COL. CHARLES A. LINDBERGH, COMMANDER RICHARD E. BYRD and
CLARENCE D. CHAMBERLIN

Posthumous awards of the Distinguished Flying Cross were also made to Capt. Clinton F. Woolsey and First Lieut. John W. Benton of the *Detroit*.

Lindbergh's Tour of the United States and Latin America

The year closed with the launching of another "Good-Will Flight." Colonel Lindbergh on his return from Paris made a tour of 22,350 miles throughout the United States in the interest of aviation, under the auspices of the Daniel Guggenheim Fund for

the Promotion of Aeronautics. He visited 82 cities, all of the 48 States, and in every instance, save one, arrived at his destination per schedule. Donald E. Keyhoe, as official aide of the Aeronautics Branch of the Department of Commerce, accompanied Lindbergh on this flight in a "Fairchild Sedan" plane, piloted by Capt. Phillip Love.

At the conclusion of the tour of the United States, Colonel Lindbergh was invited by the President of Mexico and a number of Central and South American countries to visit their respective countries. Accordingly, "We" embarked on December 13, 1927, on a non-stop flight of 2,100 miles from Washington, D. C., to Mexico



Assistant Secretary MacCracken and Colonel Lindbergh in a change of elements.—Photo Courtesy Donald Keyhoe.

City. This flight was accomplished in 27 hours and marked the beginning of a remarkable journey through Latin America.

In Mexico City, Lindbergh was the guest of the American Ambassador, Hon. Dwight W. Morrow, whose already great service to aviation as Chairman of the President's Aircraft Board in 1925 was increased by the fruitful results of Lindbergh's visit to the Mexican capital.

All Mexico gave Lindbergh an enthusiastic welcome. Mrs. Lindbergh was invited to Mexico City by President Calles to spend Christmas with her son, and she made the round trip from Detroit flying in a tri-motor Ford monoplane piloted by Harry Brooks with the skill and precision characteristic of this famous flyer. The enthusiasm with which Mexico received Lindbergh spread to Central and South America. From Mexico City, he flew to Guatemala,

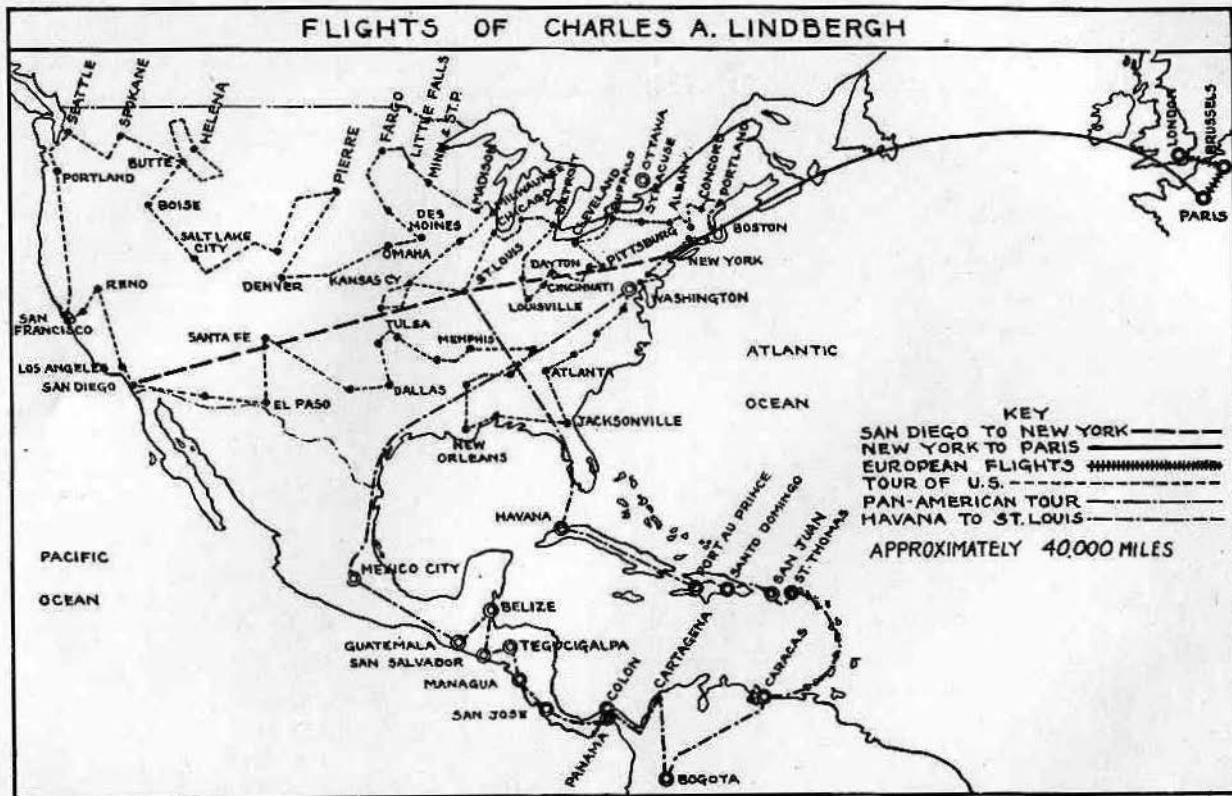


Lindbergh enjoys change in routine of banquets on his tour of the United States.
—Photo Courtesy Donald Keyhoe.



Airplane view of Olympia, Wash., showing State Capitol, taken on Lindbergh's
 Tour of the United States.—*Photo Courtesy Donald Keyhoe.*

FLIGHTS OF CHARLES A. LINDBERGH



and the last day of the year found Colonel Lindbergh at Belize, British Honduras. On the first day of the new year he departed on a continuation of his good-will trip to Salvador, Costa Rica, Republic of Honduras, Nicaragua, Panama, Colombia, and Venezuela, to return home by the way of Virgin Islands, Porto Rico, San Domingo, Haiti and Cuba. At Havana he was the guest of President Machado and the recipient of great honor by the delegates of the Sixth Pan American Conference in session in that city.

The following tabulation, prepared as this goes to press, shows the date of arrival at each stop, the distance flown and the flying time of Lindbergh's Good-Will Flight:

<i>Date</i>	<i>Place</i>	<i>Distance in Miles</i>	<i>Flying Time</i>	
			<i>Hrs.</i>	<i>Mins.</i>
Dec. 14	Mexico City	2,000	27	..
	28—Guatemala City	675	7	..
	30—Belize, British Honduras	280	3	40
Jan. 1	San Salvador	260	2	50
	3—Tegucigalpa, Honduras	180	2	5
	5—Managua, Nicaragua	160	2	30
	7—San Jose, Costa Rica	280	3	..
	9—Panama City, Panama	400	4	..
	12—France Field, Panama	40	..	25
	26—Cartagena, Colombia	400	4	40
	27—Bogota, Colombia	425	4	20
	29—Maracay, Venezuela	650	10	50
	31—St. Thomas, Virgin Islands	1,000	10	45
Feb. 2	San Juan, Porto Rico	80	1	10
	4—Santo Domingo	250	4	..
	6—Port au Prince, Haiti	180	3	30
	8—Havana, Cuba	600	9	15
TOTALS		7,860	101	..

Arctic Exploration in 1927

The year 1927 also saw the second Arctic exploration trip of Capt. George Hubert Wilkins. The expedition was sponsored by the Detroit News, the North American Newspaper Alliance, and the American Geographic Society. The equipment consisted of one Fokker and two Stinson planes. Captain Wilkins' purpose was to explore the unknown area between Northern Alaska and the North Pole, being a continuation of his trips in 1926. On March 29, Captain Wilkins started on his first extended flight. He covered more than 1,000 miles of unexplored area in the course of which he made three landings; two on account of ignition trouble, and a final one caused by exhaustion of fuel. Abandoning the plane, he and his assistant, Carl B. Eilson, made their way laboriously across 70

miles of rough ice to Beechy Point, Alaska, where they arrived on April 14. Wilkins was soon back in Fairbanks, Alaska, and on May 18, set about preparing for another flight from Point Barrow into the Arctic unknown, which, however, had to be postponed till 1928 on account of the lateness of the season.

Additional Great Flights By Pilots of "Other Nations"

While the epochal performances of American aviators across the Atlantic and Pacific riveted the attention of the world primarily



Charles L. Lawrance, designer of the Wright "Whirlwind" engine, bidding God-speed to Colonel Lindbergh before starting on his flight.

on the brilliant achievements of our fliers, other nations were giving signal demonstrations of the dependability of the airplane in world travel.

Italian

The year opened with the truly remarkable achievement of Colonel the Marchesi De Pinedo, the Italian aviator who started from Rome on February 8, in a seaplane, for the first aerial flight from Europe to America and return.

De Pinedo on leaving Rome flew along the western coast of Africa and across the South Atlantic to Fernando, Noronha Island and then down the South American coast via Rio de Janeiro to Buenos Aires. Turning northward he flew his seaplane over the heart of South America to the Caribbean Sea, and on to Havana, Cuba. From Havana De Pinedo flew to New Orleans and then as far west as Roosevelt Dam, Arizona, where his plane was destroyed by fire through the carelessness of a spectator. With a new plane at his disposal he flew from Arizona to New York, thence via Newfoundland to the Azores, thence to London and back to Rome, where he arrived on June 16, after a remarkable journey of 25,200 miles.

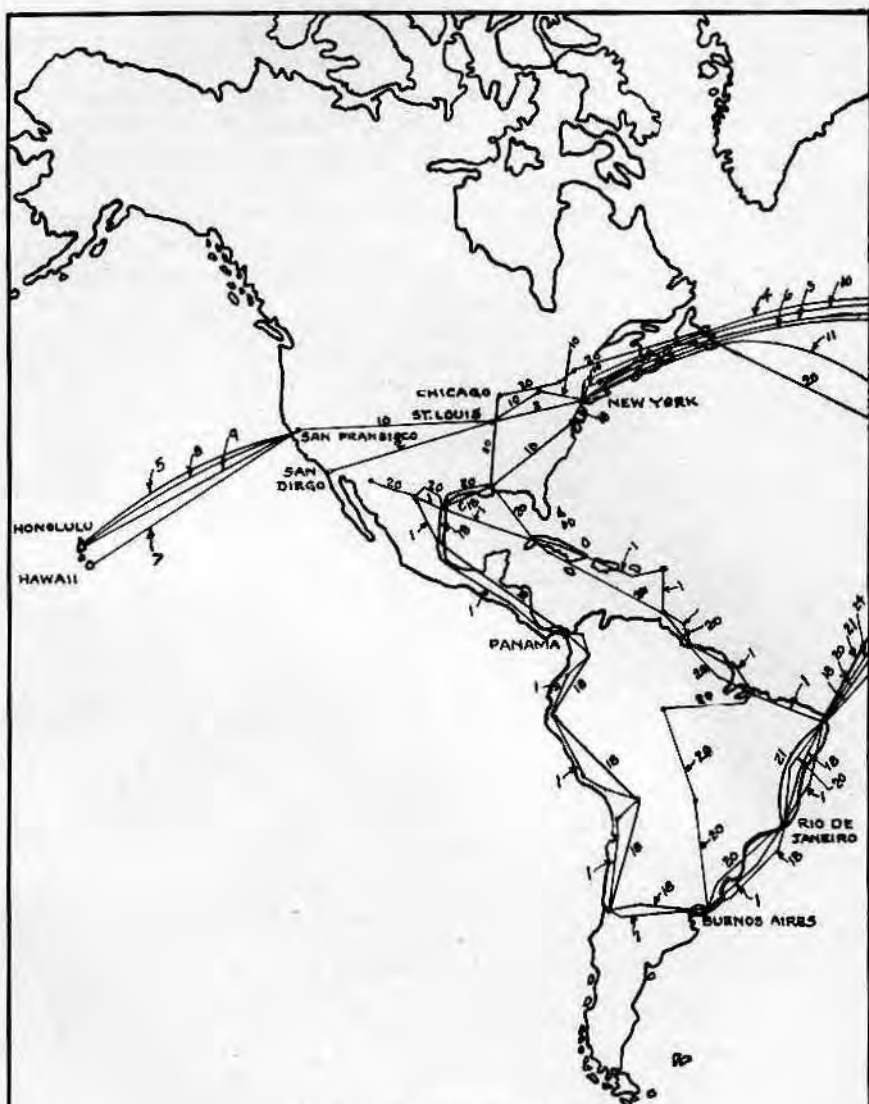
French

During the year French aviators accomplished a number of remarkable world tours. One of these was the record-making trip of Lieut. Dieudonne Costes and Com. Joseph Lebrix, who, in a general way paralleled De Pinedo's trip. The two French fliers left Paris on October 10, following the West African coast to St. Louis, French Africa, from which they crossed the South Atlantic to Port Natal, Brazil, the most northeastern projection of South America. Thence to Rio de Janeiro and Buenos Aires, where they arrived on October 20, covering a distance of 7,350 miles. From Buenos Aires, Costes and Lebrix crossed the Andes to the west coast of South America and proceeded north to Central America and thence to the United States, arriving in Washington on February 9. They were welcomed by President Coolidge, and received with great distinction and honor by both Houses of Congress. As this chapter is being written, they are being entertained at many functions participated in by official and fashionable Washington.

The successful journey made by Challes, a noted French aviator, from Paris to Saigon in Indo China and return by the way of Teheran, Persia, was another French accomplishment in 1927. Challes left Paris on October 11, and returned to Paris on November 7, covering 11,850 miles.

In the early part of the year the French aviator Dagnaux started a notable flight from Paris to Madagascar; the journey started in November, 1926, but was not concluded until July 20, 1927, at the end of which time Dagnaux had covered 8,850 miles.

There were other French aerial explorations in the past year, among them that of the French pilot Guilbaud who flew in a seaplane from Marseilles to Timbuctoo, Khartoum, Constantinople and Malta, back to Paris, a distance of 13,190 miles. This trip began in December, 1926, and was concluded in September, 1927.

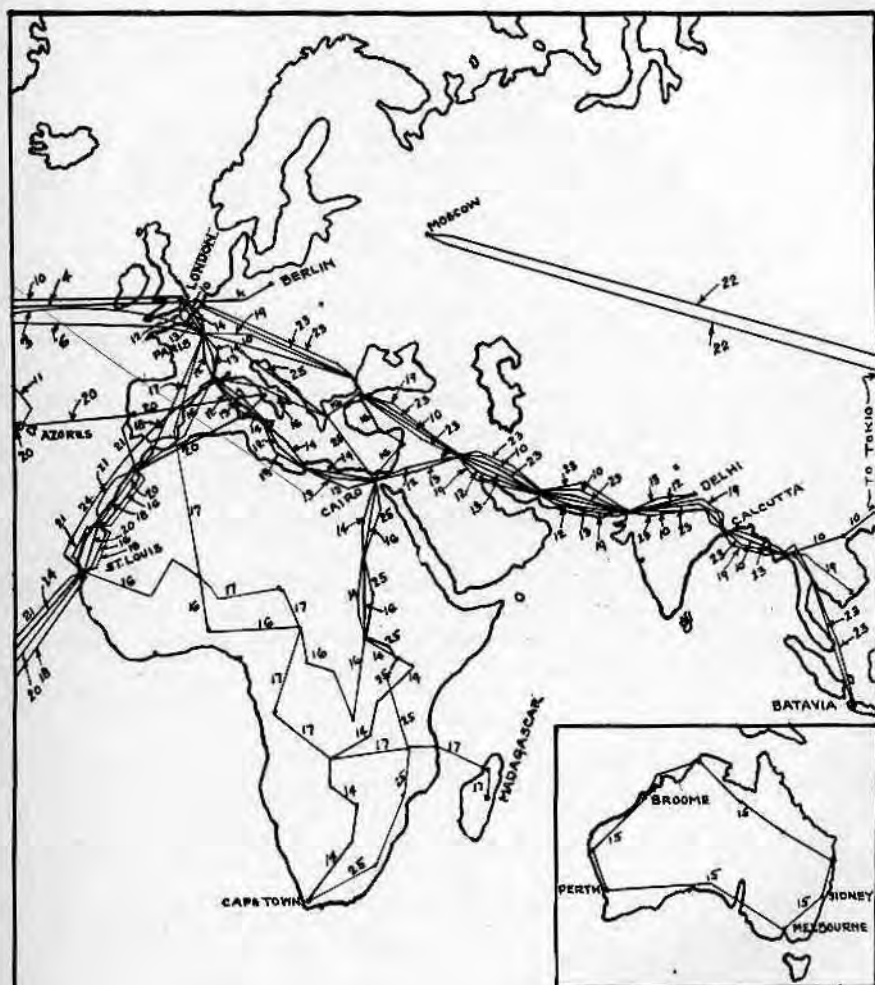


NOTABLE FLIGHTS OF 1927

Key to Numbers on Map.

- 1—Pan-American
- 2—Lindbergh—San Diego to New York
- 3—Lindbergh—New York to Paris
- 4—Chamberlin
- 5—Maitland

- 6—Byrd
- 7—Smith and Bronte
- 8—Goebel and Davis
- 9—Jensen and Schluter
- 10—Brock and Schlee



11—Haldeman-Elder
 12—Stack and Leete
 13—Sir Samuel Hoare
 14—Bentley
 15—Kingsford Smith
 16—Guilbaud
 17—Dagnaux
 18—Costes and Lebrix

19—Challes
 20—De Pinedo
 21—Sarmiento De Beires
 22—Shestakoff
 23—Koppen
 24—De Barros
 25—Mittelholzer

British

English pilots made several successful flights to Australia, India and Africa during 1927. The Royal Air Force sent an expedition of flying boats from Plymouth to Trimcomali, around Australia. The English pilot Bentley flew from London to Capetown, Africa, 8,000 miles. He left London September 2, and arrived at his destination September 28.

Sir Samuel Hoare made a tour from London to Cairo and Delhi, a distance of 9,200 miles, between December 28, 1926, and January 8, 1927.

Stack and Leete also made the London-Delhi tour, a distance of 6,900 miles. They left England in November, 1926, and arrived in India in February, 1927.

The pilots, Kingsford Smith and Ulm, circumscribed Australia between June 19 and 29, 1927. They started and finished at Sydney, covering a distance of 8,075 miles.

Lord Carberry left London November 18, and arrived at Nairobi, British East Africa, on December 15, 1927, in a Fokker "Universal" monoplane of American design and construction, powered with a Wright "Whirlwind" engine.

Other Countries

The Portugese pilot, Sarmiento De Beires, made a journey from Lisbon to Rio de Janeiro, between March 2 and June 15 in a seaplane. The distance covered was 8,250 miles. He also crossed the South Atlantic from the westernmost point of Africa to Natal, Brazil, the most northeastern point of South America.

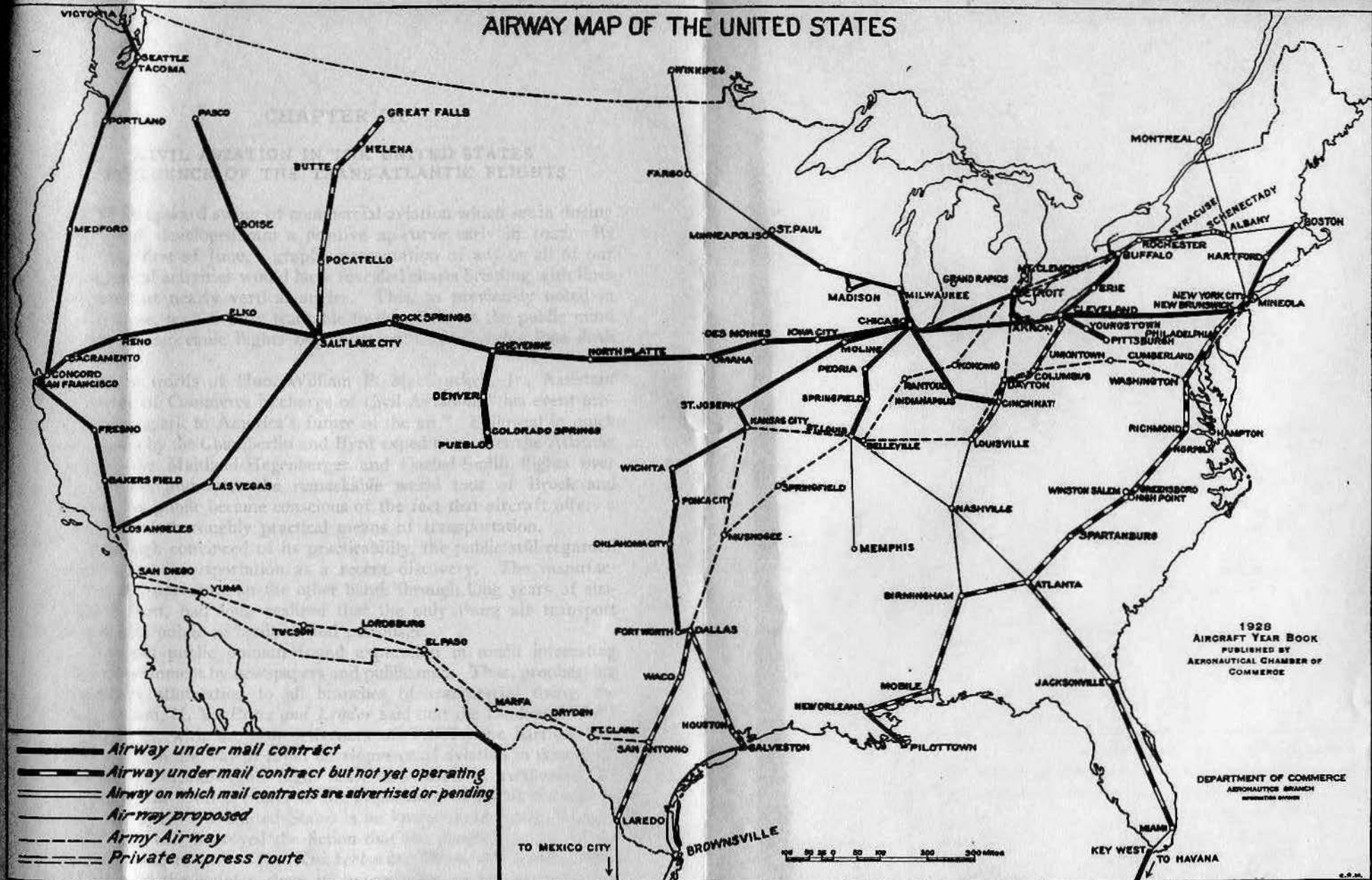
The Russian pilot, Shestakoff, made a flight of 10,250 miles between August 20 and September 1, from Moscow to Tokio and return.

De Barros, a Brazilian, flew from Genoa to Fernando de Noronha, between October, 1926, and April, 1927.

The Dutch put on record a flight from Amsterdam to Batavia, Java, and return with Pilot Koppen, covering a distance of 17,400 miles between October 1 and 25.

The Swiss took to their credit a flight from Zurich to Capetown. This journey was made by the pilot Mittelholzer between December, 1926 and February, 1927, a distance of 8,300 miles.

AIRWAY MAP OF THE UNITED STATES



AIRWAYS OF THE UNITED STATES, JANUARY 1, 1928.

No. 1, Boston-New York, Colonial Air Transport, Inc.; No. 2, Chicago-St. Louis, Robertson Aircraft Corporation; No. 3, Chicago-Dallas, National Air Transport, Inc.; No. 4, Salt Lake City-Los Angeles, Western Air Express, Inc.; No. 5, Salt Lake City-Pasco, Walter T. Varney; No. 6, Detroit-Cleveland, Ford Motor Company; No. 7, Detroit-Chicago, Ford Motor Company; No. 8, Seattle-Los Angeles, Pacific Air Transport, Inc.; No. 9, Chicago-Minneapolis, Northwest Airways, Inc.; No. 11, Cleveland-Pittsburgh, Clifford Ball; No. 12, Cheyenne-Pueblo, Western Air Express, Inc.; No. 16, Cleveland-Louisville, Continental Air Lines, Inc.;

No. 17, New York-Chicago, National Air Transport, Inc.; No. 18, Chicago-San Francisco, Boeing Air Transport, Inc.; No. 19, New York-Atlanta, Pitcairn Aviation, Inc.; No. 20, Albany-Cleveland, Colonial Western Airways, Inc.; No. 21, Dallas-Galveston, Texas Air Transport, Inc.; No. 22, Dallas-Laredo, Texas Air Transport, Inc.; No. 23, Atlanta-New Orleans, St. Tammany Gulf Coast Airways, Inc.; No. 24, Chicago-Cincinnati, Embury-Riddle Company; No. 25, Atlanta-Miami, Pitcairn Aviation, Inc.; No. 26, Great Falls-Salt Lake City, Alfred Frank.

CHAPTER III

CIVIL AVIATION IN THE UNITED STATES INFLUENCE OF THE TRANS-ATLANTIC FLIGHTS

THE upward swing of commercial aviation which set in during 1926 developed into a positive up-curve early in 1927. By the first of June, a graphic presentation of any or all of our aeronautical activities would have revealed charts bristling with lines projected at nearly vertical angles. This, as previously noted in this volume, was directly traceable to the effect on the public mind of the trans-oceanic flights beginning with Lindbergh's lone dash for Paris.

In the words of Hon. William P. MacCracken, Jr., Assistant Secretary of Commerce in charge of Civil Aviation, "this event provided the spark to America's future in the air." Followed in quick succession by the Chamberlin and Byrd expeditions over the Atlantic, and by the Maitland-Hegenberger and Goebel-Smith flights over the Pacific, and later the remarkable world tour of Brock and Schlee, the public became conscious of the fact that aircraft offers a reliable and thoroughly practical means of transportation.

Although convinced of its practicability, the public still regarded practical air transportation as a recent discovery. The manufacturers and operators on the other hand, through long years of sustained effort, had long realized that the only thing air transport lacked was public recognition and patronage.

Aroused public opinion found expression in much interesting editorial comment by newspapers and public men. Thus, prophesying immediate stimulation to all branches of commercial flying, the Binghamton, N. Y., *Press and Leader* said that the Lindbergh flight "annihilates, with the destructiveness of T.N.T., the barriers that have stood in the way of rapid development of aviation in America," and added, "Lindbergh's flight must also result in awakening the people of the United States to the importance of aerial defense on land and sea. The United States is no longer invulnerable, because Lindbergh has destroyed the fiction that the distance factor of the oceans protects us." The *Knickerbocker Press*, of Albany, suggested that the country show its appreciation of this performance by settling down seriously to the business of aviation. "Lindbergh's achievement," said this journal, "awakens a tremendous wave of enthusiasm for the air; it should be turned to practical, construc-



(Top) Loading National Air Transport Plane at Dallas with Air Express.
 (Bottom) American Railway Air Express.

tive ends." The *New York Sun* asserted that "no other American has so aroused public confidence in the possibilities of the plane as this young man has done. His own interest in flying has been transmitted to the people;" while in *Forbes*, a business and financial weekly, Edward Marshall wrote: "The really great achievement of Charles A. Lindbergh will be that the few progressive, already air-minded business men of the United States very well may hope to wake up their fellow business men to the importance and efficiency of air transport. European business men are wide awake to it. Lindbergh is a symbol. Let all American business men paste his picture in their hats."

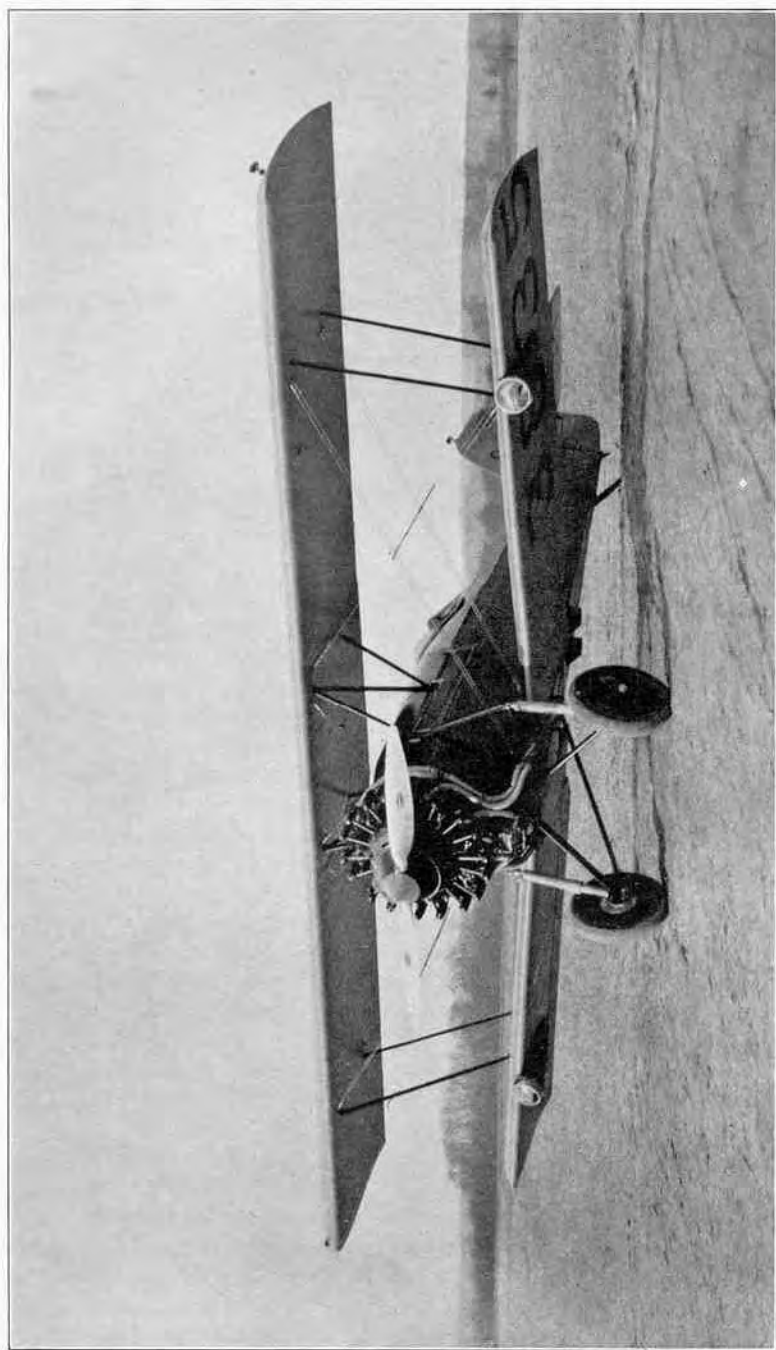
The practical reaction of the public actually outstripped the prophecy of editorial comment. It appeared as if the Air Mail, which had been functioning successfully for some years and which had been clamoring at the doors of business for recognition, had been suddenly discovered, with the result that air mail traffic increased consistently and is still growing. The volume carried in December, 1927, by each private air mail operator was 200 to 300 per cent greater than that carried previous to the Lindbergh flight.

Flying schools throughout the country received an influx of new students desirous of emulating the aviators who stood out so prominently in the news of the day. The sudden demonstration of public interest in aviation taxed the facilities of aerial service operators. This increased the demand for commercial airplanes and equipment and was promptly reflected in the volume of the aircraft manufacturing industry.

Likewise the stimulating performances of 1927 exercised an influence on the investing public, and money, everywhere, seemed to be available for aviation ventures. So marked was this development that Lindbergh himself felt constrained to sound a note of warning against investment in ill considered projects or questionable promotions. The press and business organizations also counselled caution and as a result of this steadying note, from leaders in aviation and business, the "wild-catting" and exploitation following this wave of enthusiasm was negligible, considering the magnitude and sustained character of the popular public interest.

Two far-reaching and constructive acts of the Government had already done much to stabilize air transport operations before the spectacular events of the spring and summer of 1927 gave impulse to the wide national public interest in aeronautics.

One of these was the effective functioning of the machinery set up for Government control and co-operation in commercial aviation. The years of effort that had been given to bring about the enactment



Pitcairn "Mailwing." Engine, Wright "Whirlwind."

of constructive legislation were bearing fruit through the operation of the Aeronautics Branch of the Department of Commerce. Their reasonable supervision of operations and equipment gave to the business the measure of public confidence which was needed for the safety of the public and for security of goods in transit. The work initiated by Assistant Secretary MacCracken for lighting airways and airports resulted in the extension of night flying, while the generous and sympathetic encouragement of the Department of Commerce, and the legal basis which the Civil Aeronautics Act furnished had given air transportation a practical, business foundation.

A second factor which contributed largely to stabilizing air transport was the complete retirement of the Post Office Department on September 1, 1927, from the field of aerial operations and the turning over to private operators the task of carrying all of the air mail. Of all the effective pioneering work in aviation done by the Post Office Department none had been more important, from a business standpoint, than its success in building up a substantial air mail patronage. The private operators carrying the air mail had, from the start, reasonably certain assurance of a substantial, steady income. Instead of government subsidies, as are granted in Europe, our aerial transportation lines rest upon a basis of sound business created through practical service in response to real need.

Air Mail Service

Air transport in the United States has been organized and developed on a basis of practical business utility. In Europe the development has been based upon direct governmental subsidies.

The first mission of air transport in this country was carrying the air mail. In the growth of this service the Post Office Department, the public and the air transport operators have a vital mutual interest.

Last year, when the *Aircraft Year Book* went to press, the Air Mail Service of the United States embraced eighteen lines, seventeen being private and one Government operated. The aggregate length of these routes was 9,000 miles.

As the 1928 *Aircraft Year Book* goes to press, the number of air mail routes in the United States has increased to twenty-two, all of which are privately operated, and the aggregate length of the routes has increased to 11,446 miles. Two of these routes operate a double daily service, that is, a daylight and night service. One is between New York and Chicago, and the other is the Chicago-

Kansas City leg of the Chicago-Dallas route, both operated by the National Air Transport, Inc.

The total of flying scheduled over the 11,446 miles of routes in operation and authorized at the close of 1927 exceeds 8,000,000 miles per year. Compared with the 4,128,029 miles scheduled during 1927, the increase scheduled for 1928 operations shows the tremendous growth in air transport in the space of one year.

The aggregate volume of mail carried by airplanes in the United States last year was 1,485,280 pounds, the equivalent of 59,411,200 letters. Of this service, private air mail lines flew 3,823,214 miles and carried 1,101,414 pounds of mail, receiving therefrom a total compensation of \$2,552,755.47 or 66.77 cents per mile flown.

From January to August 31, 1927, the Post Office Department still operated a part of the aerial postal service, flying 1,320,435 miles. Of this total night flying operations between New York and Chicago aggregated 319,518 miles. On July 1 and September 1, 1927, all of the Government operations were turned over to two private companies, Boeing Air Transport, Inc., and National Air Transport, Inc., respectively.

What the income from the air mail means to air transportation may be judged from the fact that during 1927 the average revenue to air mail operators in payment for services rendered was 66.77 cents per mile flown. This average included all of the recently established routes. Some of these had not had time to develop the potential traffic of the territory served, and others were operating in sparsely settled sections where a sufficient volume of mail could not be immediately expected.

The statistical table in the Appendix sets forth in detail the data of the domestic contract air mail routes. This table shows that on two routes the revenue was 98.9 and 98.02 cents respectively per mile flown, while on eight routes it ranged from 56.4 cents to as high as \$1.45 per mile flown.

In addition to the twenty-two contracts, where compensation is based upon the poundage, there are three routes operated in connection with the Foreign Mail Service for which the pay is based on a fixed rate per trip, regardless of the volume of mail carried. One of these routes, between Seattle, Washington, and Victoria, B. C., a distance of 84 miles, has been in continuous operation since 1919. It takes mail at Seattle for the Orient which has accumulated from trains arriving after the departure of the last mail train for Vancouver. This belated mail is flown to Victoria, where it overtakes the outbound ship from Vancouver, thus expediting its delivery by several days and sometimes by a whole week. This route is

operated by the Northwest Airways, Inc. During 1927 it flew 23,520 miles, carried 53,316 pounds of mail and received \$27,310 compensation.

The second route is between New Orleans and Pilottown, La., a distance of 80 miles. It places on board of outbound ships, at the mouth of the Mississippi, such mails as have arrived in New Orleans after the departure of the vessels from that port. This service, operated by the New Orleans Air Lines, likewise expedites the delivery of such belated mails destined for Central American ports by several days. In 1927 it flew 52,960 miles, carried 78,354 pounds of mail, and received \$34,798.10 compensation.



Pan-American Airways, Inc. Fokker "Tri-motor." Engines, "Whirlwind."

The third of the foreign mail transport routes operates between Key West, Fla., and Havana, Cuba, a distance of 90 miles, by Pan-American Airways, Inc. It takes all first class mail whether it bears the ordinary or the air mail postage, thereby advancing delivery of the mail in Havana a full day, and to interior points in Cuba by more than a day. This route, started in October, flew 5,940 miles, carried 49,576 pounds of mail, and received \$20,078.29 compensation.

During November, 1927, Robert S. Fogg of Concord, N. H., flew an emergency air mail route between Concord and Montpelier and Burlington, Vt., when flood conditions had deranged regular mail communications. He carried 15,900 pounds of mail.

The air mail operations by individual companies which have reported details of their 1927 activities are summarized as follows:

Boeing Air Transport, Inc.

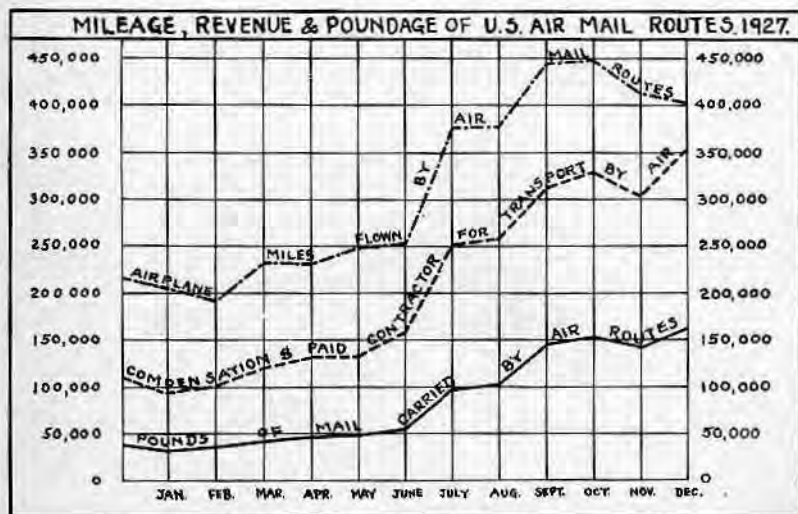
The Boeing Air Transport operates Air Mail Route No. 18, covering a distance of 1,904 miles between San Francisco and



Boeing Mail Plane. Pratt & Whitney "Wasp" engine.

Chicago. Its flying equipment consists of 24 single motored Boeing biplanes of 1,600 pounds pay load capacity each. Each plane is equipped for carrying two passengers. The planes are powered by Pratt & Whitney "Wasp" 410 H. P. radial air-cooled engines.

The route went into operation July 1, 1927, and up to the end of the year, covered 688,558 miles of flying and transported 286,712



pounds of mail. It also carried 525 passengers. The revenue to the company from mail alone was \$608,279.66, or 88.3 cents per mile flown. In these six months of flying, the line completed 353 out of 372 scheduled trips.

The flying schedule on the Chicago-San Francisco route is as follows: Westbound—Leave Chicago at 7:50 P. M., Iowa City 9:40 P. M., Omaha 12:35 A. M., North Platte 2:00 A. M., Cheyenne 4:45 A. M., Salt Lake City 9:20 A. M., Elko 11:15 A. M., Reno, 1:30 P. M., Sacramento 2:45 P. M., Oakland 4:30 P. M., arrive San Francisco at 5:30 P. M. Eastbound—Leave San Francisco at 6:00 A. M., Oakland 7:00 A. M., Sacramento 7:45 A. M., Reno 9:00 A. M., Elko 11:00 A. M., Salt Lake City 3:05 P. M., Cheyenne 7:30 P. M., Omaha 12:30 A. M., Des Moines 1:30 A. M., arrive at Chicago 5:45 A. M.

The officers of Boeing Air Transport, Inc., are: W. E. Boeing, Chairman of Board; P. G. Johnson, President; O. W. Tupper, Secretary; C. L. Egtvedt, Treasurer; Edward Hubbard, Vice-

President in charge of Operations; W. G. Herron, Vice President in charge of Traffic, and D. B. Colyer, Superintendent. The executive offices are located in Seattle, and the operating headquarters are located at Salt Lake City.

Clifford Ball Air Line

Air Mail Route No. 11, running between Pittsburgh and Cleveland, is operated by Clifford Ball of Pittsburgh. His operating headquarters are at McKeesport Flying Field, McKeesport, Pa.

During 1927 there were over 70,000 miles flown on this route, with a performance of 95 per cent completed mileage. Of 510 trip



Cleveland-Youngstown-Pittsburgh Route, operated by Clifford Ball, using the Pitcairn "Mailwing," "Whirlwind" engine.

schedules, 468 were completed; 20 trips had to be cancelled on account of the weather. In addition to the regular schedule mentioned, 25 special trips were made.

The equipment of this line comprises three Waco No. 9, and one Waco No. 10, powered with Curtiss OX-5 engines. Neither passengers nor freight were carried, but two Ryan "Brougham" planes and one Pitcairn "Mailwing" plane have been added to the equipment for 1928 for the carrying of passengers.

The Post Office Department reports 19,572 pounds of mail carried on this line, the compensation for which was \$58,719.45.

The flying schedule is as follows: Northbound—Leave Pittsburgh 2:30 P. M., Youngstown 3:15 P. M., arrive Cleveland 4:00 P. M. Southbound—Leave Cleveland 12:15 P. M., Youngstown 1:00 P. M., arriving Pittsburgh 1:45 P. M.

Colonial Air Transport

Air Mail Route No. 1, between Boston and New York, is operated by the Colonial Air Transport, Inc., with general offices in New York City.

The route in 1927 carried 20,895 pounds of mail, 1,140 pounds of express matter, and 4,016 passengers, which includes passengers taken on short sight-seeing trips around New York City on Sundays and holidays.



Colonial Air Transport. Fokker "Tri-motor." Engine, "Whirlwind."

The equipment of the Colonial Air Transport, Inc., consists of a Fokker "Universal" with a Wright J4B engine and having a pay load capacity of 800 pounds; this plane is capable of carrying four passengers. There is also a "Stinson-Detroit" with a J4B Wright engine of the same pay load and passenger capacity as the Fokker, and two Pitcairn "Mailwing" planes with Wright J5CAF engines with pay load capacity of 600 pounds and including facilities for one passenger each.

The mail schedule eastbound is as follows: Leave Hadley Field, N. J., 5:00 A. M., Hartford 6:35 A. M., and arrive at Boston 7:50 A. M. Westbound—Leave Boston 6:15 A. M., Hartford 7:25 P. M., arrive at Hadley Field 9:00 P. M. As this route is flown part of the year after dark, lights have been installed for night flying.

The performance statistics for 1927 of the Colonial Air Transport show a total mileage with mail of 97,767, out of 117,504 miles

scheduled. There were also 21,523 miles of special flying and ferrying of planes and test flying aggregated 14,000 miles additional. There were 906 trips scheduled on this route for 1927 of which 94 could not be started on account of impossible weather conditions.

The Post Office report shows that the percentage of performances for the year was 83.2 per cent. The compensation received for carrying mail was \$60,560.62.

The officers of the Colonial Air Transport, Inc., are: Gen. John F. O'Ryan, President; Harry Whittemore, Jr., Vice-President; Lawrence La T. Driggs, Vice-President; Sherman M. Fairchild, Secretary; William A. Rockefeller, Treasurer; James A. Walsh,



Colonial Western Air Transport. Fairchild Cabin Monoplane, Engine, "Whirlwind."

Assistant Secretary and Assistant Treasurer; D. E. Rolland, Operations Manager; Sumner Sewall, Traffic Manager.

Colonial Western Airways

One of the routes which went into operation late in 1927 was Air Mail Route No. 20 from Albany via Schenectady, Syracuse, Rochester and Buffalo to Cleveland, a distance of 452 miles. Of this route, the leg from Buffalo to Cleveland, a distance of 174 miles, was put into operation on December 17, and in the two weeks following it flew 3,052 miles with the mail, carrying 329 pounds and receiving therefor \$365.40. This route is operated by the Colonial Western Airways, Inc., which was organized in May, 1927. Its general office is in New York. The officers of the company are:

Gen. John F. O'Ryan, President; Harry Whittemore, Jr., Treasurer; Lawrence La T. Driggs, Secretary; James A. Walsh, Assistant Secretary-Treasurer; Edwin N. Ronne, Operations Manager; and William T. Lyman, Traffic Manager. Governor John H. Trumbull of Connecticut is Chairman of the Board of Directors.

The equipment of the Colonial Western Airways, Inc., consists of three Fairchild cabin monoplanes equipped with Wright J5CA engines, and a Pitcairn "Mailwing" plane powered with a Wright J5CA engine. The pay load capacity of each of the Fairchild planes, with accommodations for four passengers each is 800 pounds, and of the Pitcairn planes 600 pounds each.



Colonial Western Air Transport. Pitcairn "Mailwing." Engine, "Whirlwind."

The schedule of this route, when in full operation, will be as follows: Westbound—Leave Albany at 11:00 A. M., Schenectady 11:15 A. M., Syracuse 12:35 A. M., Rochester 1:35 P. M., Buffalo 2:25 P. M., arrive at Cleveland 4:15 P. M. Eastbound—Leave Cleveland at 2:15 P. M., Buffalo 2:05 P. M., Rochester 2:55 P. M., Syracuse 3:55 P. M., Schenectady 5:15 P. M., arrive at Albany 5:30 P. M.

Continental Air Lines

Air Mail Route No. 16, from Cleveland to Louisville, a distance of 339 miles, was awarded in 1927 to the Continental Air Lines. The executive offices of the corporation are located in Cleveland and the general offices in Cincinnati. The officers of the company are: P. P. Cunningham, President; E. L. Shueren and M. P.

Jacomini, Vice-Presidents; P. G. Vondersmith, Secretary-Treasurer, and V. K. Griffin, Assistant Secretary.

The actual operations of the line could not be started during 1927 but are scheduled to begin as soon as the airway between Cleveland and Louisville is lighted, this route being entirely a night operation.

The schedule of the operation will be as follows: Southbound—Leave Cleveland 2:45 A. M., Akron 3:10 A. M., Columbus 5:00 A. M., Dayton 6:00 A. M., Cincinnati 7:00 A. M., arrive at Louisville 7:15 A. M. Northbound—Leave Louisville 6:00 P. M., Cincinnati 8:30 P. M., Dayton 9:15 P. M., Columbus 10:15 P. M., Akron 11:45 P. M., arrive at Cleveland 12:05 A. M.

The equipment of the route will consist of three special model Travel Air biplanes powered with Wright "Whirlwind" engines. The cabins of each plane can be quickly converted into either a passenger or freight compartment and will have room for four passengers. The planes will have a pay load capacity of 1,000 pounds.

Embry-Riddle Company

Air Mail Route No. 24 was inaugurated December 17, 1927, by the Embry-Riddle Company between Cincinnati and Chicago, a distance of 270 miles. The flying equipment consists of six Waco planes, three with Wright "Whirlwind" engines, two with Hispano-Suiza, and one with Curtiss OX5 motors, also one Ryan Wright "Whirlwind" cabin monoplane. Two of the planes are strictly mail, and two carry passengers as well as mail. One plane is used for instruction purposes.

The headquarters of the company are located at Lurken Airport, Cincinnati. The officers are T. Higbee Embry, President; Susan H. Embry, Vice-President; John Paul Riddle, Secretary.

In the two weeks operations of the company to the close of 1927, there were carried 1,043 pounds of mail, the compensation for which was \$1,533.76. A total of 8,100 miles was scheduled to be flown, of which 6,516 were completed, being a performance of 80.44 per cent.

The schedule for this route is as follows: Northbound—Leave Cincinnati 3:45 P. M., Indianapolis 4:00 P. M., (C.T.) arrive Chicago 5:45 P. M. Southbound—Leave Chicago 6:00 A. M., Indianapolis 7:55 A. M., and arrive Cincinnati 10:00 A. M.

Ford Motor Company

The air mail routes between Chicago and Detroit and Detroit and Cleveland are operated by the Ford Motor Company, of which

Edsel B. Ford is President and William B. Mayo is General Manager. The Chief of Operations of the Aviation Division of the company is E. G. Hamilton.

In addition to these mail routes, the company operates an aerial freight line between Detroit and Buffalo. The three routes are operated with four single engine Ford-Stout monoplanes equipped with Liberty engines and two tri-motored Ford-Stout monoplanes



Ford Tri-motored Plane used by Stout Air Service.
Engine, Wright "Whirlwind."

equipped with Wright "Whirlwind" engines. No passengers are carried.

The flying operations for the three routes of the Ford group were as follows:

Detroit-Chicago: There were 614 trips scheduled; 588 were completed. The mileage on this route was 145,877; freight carried 729,422 pounds; mail carried 11,990 pounds; mail compensation, \$13,251.11.

Detroit-Cleveland route: Trips scheduled 888; trips completed 816. Miles flown aggregated 105,465; freight carried, 1,013,996 pounds; mail carried 1,723 pounds; mail revenue \$1,862.99.

Detroit-Buffalo route: Trips scheduled 470; trips completed 440.



(Top) Ford Tri-motor Monoplane of N.A.T. Engine, "Whirlwind."
 (Bottom) Travel Air Cabin Monoplane of N.A.T. Engine, "Whirlwind."

Miles flown 106,181; freight carried 559,846 pounds. No mail is carried on this route.

The grand total operations on the Ford Group comprised 4,032½ hours of flying; 357,523 miles flown; 2,302,264 pounds of freight; 13,714 pounds of mail.

The schedule on these three routes are: Leave Chicago 9:30 A. M., arrive Detroit 12:00 Noon. Leave Detroit 1:00 P. M., arrive Chicago 4:30 P. M. Leave Detroit 10:40 A. M., arrive Cleveland 12:10 P. M. Leave Cleveland 3:00 P. M., arrive Detroit 4:30 P. M. Leave Detroit 8:45 A. M., arrive Buffalo 12:15 P. M. Leave Buffalo 1:00 P. M., arrive Detroit 4:30 P. M.

National Air Transport

The National Air Transport, Inc., operates two air mail routes, and does perhaps more night flying than any aeronautical organization in the world. Since April 15, 1926, it has operated Air Mail Route No. 3 from Chicago to Dallas, a distance of 987 miles. This route is now flown in both directions entirely at night. In addition to this night mail and express service, the company operates a mail and passenger service in the daytime between Chicago and Kansas City.

The second air mail route operated by the National Air Transport is Route No. 17, between New York and Chicago, a distance of 723 miles, which service began September 1, 1927. This service comprises an overnight run between New York and Chicago, as well as a day run which connects at Chicago with Route No. 17 of the Boeing Air Transport for San Francisco. The schedules of the two National Air Transport lines for 1928 call for 1,298,300 miles annually of night flying.

The equipment of the National Air Transport comprises 18 Douglas Type M3 planes with Liberty engines, 8 Travel Airs with Wright "Whirlwind" engines, 7 Curtiss "Carrier Pigeons" with Liberty engines, one tri-motored Ford with Wright "Whirlwind" engines, and 1 Mercury airplane. The capacity of the planes ranges from 600 to 1,000 pounds of mail. In addition, there have been placed on the Chicago-Kansas City daylight passenger service, Travel Air cabin monoplanes with capacity for three passengers, besides mail and express.

The operations of the two routes of the National Air Transport, Inc., are set forth in detail by route in the consolidated air mail table in the Appendix. The operations of the two lines aggregate 279,969 pounds of mail transported; 16,100 pounds of express carried (since September 1, 1927); 275 paid passengers, with 105,000 passenger



"TRAVEL AIR"

(Top) Curtiss "OX5" engine. (Center) Fairchild "Caminez" engine.
(Bottom) Wright "Whirlwind" engine.

miles flown. There were scheduled on the two routes during the year 1,218 trips of which weather permitted 1,146 to be attempted. Of these trips, 1,002 were completed. This record, of course, includes the night flying during the inclement weather of November and December. The total mileage scheduled to be flown with mail during 1927 for the two routes was 1,078,186, of which 1,005,021 miles were completed. In the conduct of these operations it was



Unloading Passengers and Express from National Air Transport Plane
at Dallas Airport.

necessary to fly an additional 86,646 miles for ferrying ships and testing equipment.

The air mail schedule on the two routes is as follows:

New York-Chicago Day Line—Leave New York 12:15 P. M., Cleveland 3:55 P. M., arrive Chicago 7:00 P. M. Leave Chicago 8:00 A. M., Cleveland 11:00 A. M., arrive New York 4:45 P. M.

New York-Chicago Night Line—Leave New York 9:35 P. M., Cleveland 1:30 A. M., arrive Chicago 5:35 A. M. Leave Chicago 8:00 P. M., Cleveland 11:00 P. M., arrive New York 4:45 A. M.

Chicago-Dallas Day Line—Leave Chicago 7:30 A. M., Moline 9:30 A. M., St. Joseph 12:50 P. M., arriving Kansas City 1:25

P. M. Leave Kansas City 2:05 P. M., St. Joseph 2:40 P. M., Moline 5:30 P. M., arrive Chicago 7:20 P. M.

Chicago-Dallas Night Line—Leave Chicago 8:00 P. M., Moline 9:50 P. M., Kansas City 1:10 A. M., Wichita 3:15 A. M., Ponca City 4:10 A. M., Oklahoma City 5:25 A. M., Ft. Worth 7:35 A. M., arrive Dallas 8:00 A. M. Leave Dallas 7:00 P. M., Ft. Worth 7:30 P. M., Oklahoma City 9:40 P. M., Ponca City 10:50 P. M., Wichita 11:20 P. M., Kansas City 1:55 A. M., Moline 5:10 A. M., arrive Chicago 7:00 A. M.

Chicago-Kansas City Day Line—Leave Chicago 7:30 A. M., Moline 9:30 A. M., St. Joseph 12:50 P. M., and arrive Kansas City 1:25 P. M. Leave Kansas City 2:05 P. M., St. Joseph 2:40 P. M., Moline 5:30 P. M., and arrive Chicago 7:20 P. M.

The general officers of the National Air Transport, Inc., are: President, Earl H. Reynolds; First Vice-President, Charles L. Lawrance; Second Vice-President, C. T. Ludington; Third Vice-President, Eugene W. Lewis; Fourth Vice-President and General Manager, Paul Henderson; Secretary and Treasurer, John J. Mitchell, Jr. The general offices are located in Chicago with Col. Paul Henderson, Vice-President and General Manager, in charge; Donald Bartlett, Assistant to the General Manager; Edward M. Lee, Assistant Secretary-Treasurer; R. W. Ireland, General Traffic Manager; L. D. Seymour, Chief Engineer, and F. D. Myers, Auditor.

Northwest Airways

Air Mail Route No. 9, between Chicago and St. Paul, Minn., a distance of 383 miles, is operated by Northwest Airways, Inc. The company carried 27,647 pounds of mail, 1,048 passengers and 27,030 pounds of freight during 1927. Its compensation for carrying mail was \$76,029.51. It flew 180,213 miles with mail, being 91.5 per cent performance of its scheduled mail mileage. Of 521 scheduled trips it completed 459. Every trip scheduled was actually started, but 62 were not completed on account of weather.

The equipment of the Northwest Airways comprises three "Stinson-Detroiter" cabin planes and one Laird commercial, all equipped with Wright "Whirlwind" engines. There were no accidents during the year's operations.

The general headquarters of the company are located at St. Paul. The officers are: Harold H. Emmons, President; Frank W. Blair, Vice-President; L. H. Brittin, Vice-President and General Manager; W. B. Stout, Secretary, and C. E. Johnson, Treasurer.



(Top) Colonial Air Transport Fokker "Universal." Engine, Wright "Whirlwind." (Bottom) Fokker "Super Universal." Engine, Pratt & Whitney "Wasp."

Northwestern Air Service

The oldest mail air route operated in connection with the Foreign Mail Service is that between Seattle and Victoria, B. C. This route was established in 1919 under a contract let to Edward Hubbard. It has been in continuous operation ever since, with a total of 1,800,000 miles of flying to date. During 1927, 23,520 miles were flown on which 53,316 pounds of mail was carried. The contractor received as compensation for carrying United States mail, \$27,310. In its seven and a half years of operations, an average of two and a half trips a year were made impossible by the weather, while fog was responsible for four forced landings a year, on each of which occasions, however, the trips were completed.

This route is now operated by the Northwestern Air Service, which has broadened its activities. It does a passenger business of about 200 persons transported per year. The company will also open a school for flying instructions and devote its facilities to general commercial aviation in addition to the operation of the air mail.

The officers of the Northwestern Air Service are: William Strain, President; Charles P. Wayne, Vice-President; Raymount G. Wright, Secretary and Treasurer, and N. A. Bartels, General Manager. The general offices are located in Seattle, Wash.

Pacific Air Transport

The Pacific Air Transport operates Mail Route No. 8, between Seattle, Wash., and Los Angeles, Cal., a distance of 1,099 miles. The equipment of this route is two Fokker Universal cabin planes, five Travel Air biplanes, two Ryan monoplanes and one Romair biplane, all equipped with Wright "Whirlwind" motors.

The controlling interest in this company recently passed into the hands of the Boeing Air Transport, Inc. The officers of the Pacific Air Transport are: P. G. Johnson, President; A. K. Humphries, Vice-President and General Manager; Vern C. Gorst, Vice-President; R. C. Bradshaw, Secretary; E. L. Egtvedt, Treasurer; W. C. Moeller, Assistant Treasurer; Grover Tyler, General Superintendent. The headquarters are San Francisco.

The company reports that during 1927 a total of 7,752 hours were flown with a total mileage of 693,350. The line carried 10,252 passengers, 76,237 pounds of mail and 859 pounds of express. The compensation to the company from mail alone was 35.5 cents per mile.

The company has increased its equipment by the addition of four



(Top) Robertson Aircraft Corp.'s fleet of de Havillands on St. Louis-Chicago Air Mail Route. (Bottom) Ryan Monoplane (Wright "Whirlwind" engine). Used by Pacific Air Transport from Seattle to Los Angeles.

Boeing passenger planes powered with Pratt & Whitney "Wasp" motors. These planes will carry six passengers each.

The mail schedule of this line is as follows: Leave Portland 7:00 A. M., Medford, Ore., 9:30 A. M., San Francisco, 1:15 P. M., Fresno 3:15 P. M., Bakersfield 4:45 P. M., arrive Los Angeles 6:15 P. M. Leave Los Angeles at 12:01 A. M., Bakersfield 1:30 A. M., Fresno 3:00 A. M., San Francisco 5:00 A. M., Medford 9:00 A. M., Vancouver 11:30 A. M., Tacoma 1:30 A. M. and arrive at Seattle 2:00 P. M. This route southbound starts from Portland, Ore., and ends northbound at Seattle, Wash.

Pan-American Airways

One of the three air mail contract routes operated in connection with expediting the foreign mails is the 90-mile route between Key West and Havana operated by the Pan-American Airways, Inc., its compensation being 40½ cents for each pound of mail carried. As has been explained in this chapter, this means regular letter mail without regard as to whether it carries air mail postage. The company also has a contract with the Cuban government carrying special air mail postage and originating in Cuba for the United States.

The Pan-American Airways began operations October 19, 1927, and for the 11 days of that month it flew 450 miles and carried 3,567 pounds of mail. During November the flying operations with United States mail totaled 2,700 miles, and the weight of mail was 19,516 pounds. During December the mileage for the Post Office Department was 2,790 miles, with a total of 26,493 pounds of mail. The mileage above given is approximately half of the actual mileage flown, as the company is paid by the United States Government for one way each day. For compensation for the return trip from Havana it looks to air mail originating in Cuba. This in 1927 amounted to 2,576 pounds. The line carried neither passengers nor freight, but is making preparations to do so during 1928. The total compensation for carrying United States mail in 1927 was \$20,078.29.

The equipment consisted of two tri-motored Fokker land planes, powered with Wright J5C engines. The operations were 100 per cent perfect from a flying standpoint, 131 trips being scheduled and flown without a forced landing.

The plane leaves Key West every morning at 7:45 A. M., after the arrival of mail from the North, and reaches Havana at 9:00 A. M. Returning, it leaves Havana at 4:00 P. M. and arrives at Key West at 5:15 P. M. Special passenger equipment is being obtained for 1928, and passenger stations to house customs and emi-

gration officials, with waiting room for passengers, have been erected on the fields at Havana and Key West.

The officers of the Pan-American Airways, Inc., are: J. T. Trippe, President; George Mixter, Vice-President; Robert Atkins, Treasurer; H. P. Morris, Secretary and J. E. Whitbeck, Manager of Operations. Its general offices are in New York City.

Pitcairn Aviation

In 1927 a contract was let by the Post Office Department to Pitcairn Aviation, Inc., with general offices in Philadelphia, for an air mail route from New York to Atlanta and Atlanta to Miami. Actual operations were held up pending the lighting of the airway for this route as the schedule calls for over night flying between New York and Atlanta.

The equipment to be used on this route will be eight Pitcairn "Mailwing" planes, powered with Wright "Whirlwind" engines. The planes will have a capacity of between 500 and 600 pounds of mail and express. The schedule will be: Southbound—Leave New



Stearman Biplane, Engine, "Whirlwind." Used in Mail Service,
Varney Air Line.

York 9:00 P. M., Philadelphia 9:40 P. M., Washington 11:10 P. M., Richmond 12:25 A. M., Greensboro 2:25 A. M., Spartanburg 4:00 A. M., Atlanta 6:00 A. M., Jacksonville 9:25 A. M. and arrive at Miami 2:40 P. M. Northbound—Leave Miami 2:40 P. M., Jacksonville 5:40 P. M., Atlanta 9:00 P. M., Spartanburg 11:05 P. M., Greensboro 12:20 A. M., Richmond 2:40 A. M., Washington 3:35 A. M., Philadelphia 5:25 A. M., New York 6:00 A. M. The New York terminus will be Hadley Field.

The corporation has subsidiary companies at Richmond, Va., Greensboro, N. C., Spartanburg, S. C., and Atlanta, Ga., where general aerial service operations will be conducted.

The officers of Pitcairn Aviation, Inc., are: Harold F. Pitcairn, President; Geoffrey S. Childs, Vice-President and General Manager; Kesneil C. Acton, Secretary; James G. Ray, Operation Manager; W. Laurence Le Page, Assistant to Vice-President.

Robertson Aircraft Corporation

Air Mail Route No. 12 is operated by The Robertson Aircraft Corporation of Anglum, Mo., between St. Louis and Chicago. The distance of this route is 278 miles.

This route is lighted with twenty-four revolving beacons. There are nine landing fields. The equipment consists of five D.H.4, three Douglas, one Standard and one Waco airplane.

The traffic over this line was principally mail. Its schedule is as follows: Northbound—Leave St. Louis at 4:15 P. M., Springfield 5:20 P. M., Peoria 6:10 P. M., and arriving at Chicago at 7:30 P. M. Southbound—Leave Chicago 5:50 A. M., Peoria 7:25 A. M., Springfield 8:05 A. M., arriving at St. Louis at 9:15 A. M.

During 1927 the Robertson Aircraft Corporation reports that of 513 air mail trips scheduled, all except two were started, and of the 511 started, 490 were completed, making a performance of 96.81 per cent. In the course of the year, the flying hours amounted to 1,497 and mileage to 140,470, during which operations there were but two forced landings.

The average speed was 94 miles per hour. The route carried 34,772 pounds of mail and ten passengers, and its compensation for carrying mail during the year was \$138,714.26, or 58.4 cents per mile. The corporation reports that about 25 per cent of its mail flying was done in fog.

In addition to the mail flying, there was flown on the route 278 miles in ferrying and testing. There were no accidents and no injuries. This is the route on which Colonel Lindbergh flew as air mail pilot prior to his famous New York-Paris flight.

The officers of the Robertson Aircraft Corporation are: F. H. Robertson, President; J. M. Robertson, Vice-President; Harry Perkins, Secretary.

Texas Air Transport, Inc.

Two routes have been established in Texas to connect with the National Air Transport, Inc., at Dallas. These routes are operated by the Texas Air Transport, Inc., and operate between Dallas and San Antonio, 267 miles, and Dallas and Galveston, 283 miles.

The equipment for the two routes consists of 4 Pitcairn "Mailwing" planes with Wright "Whirlwind" motors, and three Swallows with Curtiss OX5 motors.

The officers of the Texas Air Transport, Inc., with headquarters at Fort Worth, Texas, are R. C. Bowen, President; Temple Bowen, Vice-President and General Manager; F. G. Lippitt, Vice-President and Treasurer, and Tom Hardin, Operations Manager.

The schedules of the Texas Air Transport, Inc., routes are as follows:

Dallas-San Antonio: Southbound—Leave Dallas 7:45 A. M., Fort Worth 8:15 A. M., Waco 9:20 A. M., Austin 10:25 A. M., arrive San Antonio 11:15 A. M. Northbound—Leave San Antonio 4:15 P. M., Austin 5:10 P. M., Waco 6:15 P. M., Fort Worth 7:15 P. M., arrive Dallas 7:37 P. M.

Dallas-Galveston: Southbound—Leave Dallas 7:45 A. M., Fort Worth 8:15 A. M., Houston, 10:50 A. M., arrive Galveston 11:30 A. M. Northbound—Leave Galveston 4:00 P. M., Houston 4:45 P. M., Fort Worth 7:15 P. M., arrive Dallas 7:37 P. M.

Varney Air Line

The Varney Air Line which operates Air Mail Route No. 5 between Pasco, Wash., and Salt Lake City, a distance of 530 miles, is owned and operated by Walter T. Varney. Operation Manager and Chief Pilot is Leon D. Cuddeback; Business Manager is Charles T. Wrightson; and Traffic Manager is Claude V. O'Callahan. The headquarters of the line are in Boise, Idaho.

During 1927 the Varney Air Lines flew 318,715 miles with mail, with a record of 85.9 per cent of scheduled mileage completed. The total amount of mail carried was 59,972 pounds. The line does not carry passengers but expects to do so in the future with multi-motored planes. The revenue of the company for carrying mail was \$179,918.61 or 56.4 cents per mile.

The equipment of this air mail route consists of five Swallow mail planes equipped with Wright "Whirlwind" engines, and one

Stearman plane also powered with a Wright "Whirlwind" engine. The mail capacity of the Swallow planes is 300 pounds, and of the Stearman 350 pounds.



Mail Planes of Walter T. Varney on Boise, Idaho, Airport.

The schedule of this line is as follows: Northbound—Leave Salt Lake City 9:45 A. M., Boise, Idaho 1:15 P. M., arrive Pasco, Wash. 4:35 P. M. Southbound—Leave Pasco 6:00 A. M., Boise 9:20 A. M., arrive Salt Lake City 12:50 P. M.

Western Air Express

The Western Air Express, Inc., with headquarters at Los Angeles, operates Air Mail Route No. 4, between Los Angeles and Salt Lake City, a distance of 600 miles. The company carries passengers and express in addition to mail.

The Western Air Express carried 203,082 pounds of mail and flew 457,516 miles on the Salt Lake City-Los Angeles route. The flying equipment consists of Douglas, Fokker and Stearman planes.

The operating personnel of the Los Angeles-Salt Lake City line consists of four pilots, one reserve pilot, ten mechanics, three radio operators, three stock clerks and three watchmen. This covers the two terminal landing fields and the intermediate landing station at Las Vegas, Nevada. Seventy-five emergency landing fields have been chartered along the 600 miles of route, and at the end of the year, the lighting of this airway was completed from Los Angeles to Nevada. A short wave radio is used for inter-field communication.

The operating schedule is as follows: Leave Los Angeles daily 7:30 A. M., arrive Salt Lake City 3:30 P. M. Leave Salt Lake City daily 9:10 A. M., arrive Los Angeles 5:25 P. M. In addition to the mail, the line in 1927 carried 4,529 pounds of express and 400 passengers.

Late in 1927 the Western Air Express took over Air Mail Route No. 12, between Cheyenne, Wyoming and Pueblo, Colo. The schedule is as follows: Leave Cheyenne at 5:30 A. M., arrive Pueblo



Douglas Mail Plane. Used by Western Air Express.

8:30 A. M. Leave Pueblo 4:00 P. M., arrive at Cheyenne at 7:30 P. M.

The officers of the Western Air Express are Harris M. Hanshue, President and General Manager; Major C. C. Moseley, Vice-President and in charge of operations; Byron L. Graves, Treasurer; H. M. Wright, Secretary; James G. Wolley, Traffic Manager.

Air Express Service

Heretofore, air transport in the United States depended almost altogether on a single revenue producing commodity, the mail. Gradually some of the operators began to reach out after freight and passenger business. Educating the business public to avail itself of the speedier facilities of aviation for express freight was found to be long, steady, uphill work, but the efforts are gradually

bearing fruit. The chief forward step in the development of air express in 1927 was the decision of the American Railway Express to enter the field of aviation through contracts with air transport lines, similar to its arrangements with the railroads. The first of these contracts were with the following companies: National Air Transport, Inc., from New York to Chicago, and from Chicago to Dallas; Boeing Air Transport, Inc., from Chicago to San Francisco; Colonial Air Transport, Inc., from Boston to New York; Western Air Express, Inc., from Salt Lake City to Los Angeles, an aggregate daily service of more than 4,000 miles of route.

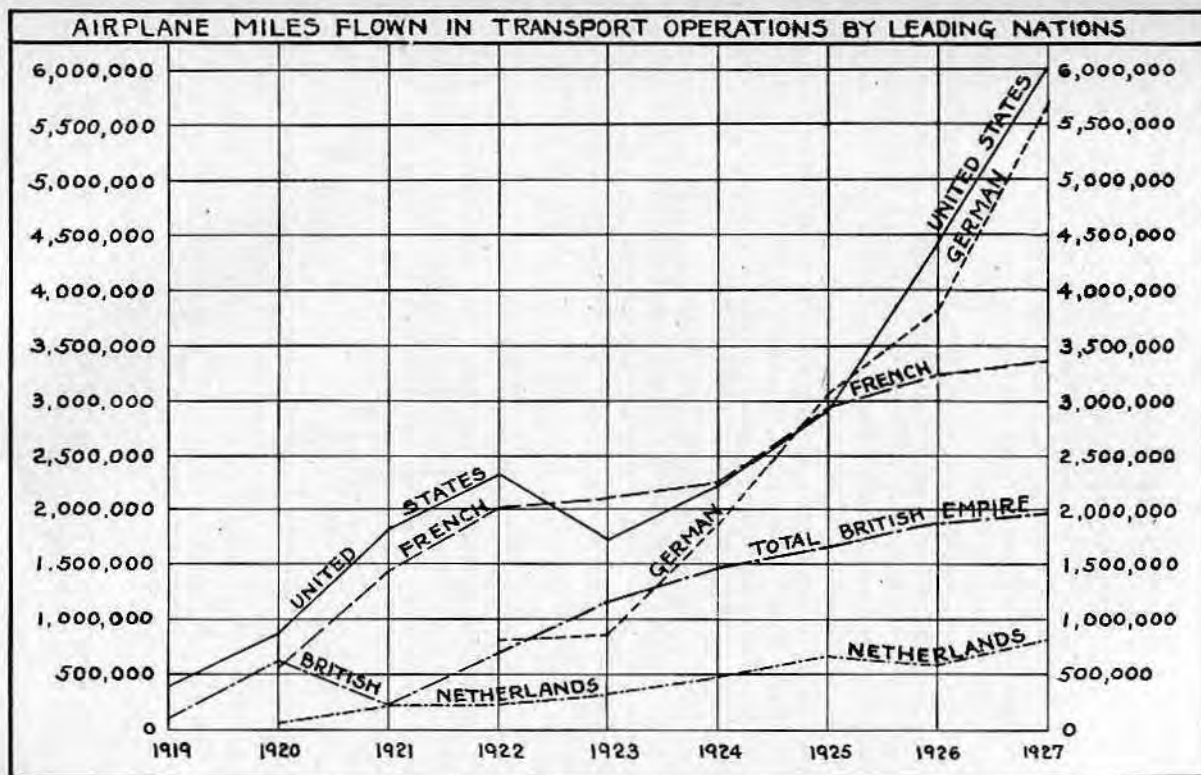
Express service was inaugurated over the above lines on September 1st, when the first consignment of express was carried from Hadley Field, the New York terminus of the National Air Transport, Inc. The start was made in a downpour of rain but the seasoned mail flyers brought the daily cargo of letters together with 580 pounds of express through to various air route destinations on time, thus establishing this new business as another important service to the public.

Perhaps nothing in the momentous year of 1927 turned the attention of business men toward commercial aviation more effectively than this forward looking action of the American Railway Express Company.

"This has been a summer of progress in air transportation," said the *Cleveland Plain Dealer*, referring to this step by the American Railway Express, "and though much less spectacular than the long trans-oceanic flights, the beginning of real commercial aviation is, from the practical point of view, the most noteworthy development of all."

The entrance into the field of commercial aviation by the great carriers of express naturally strengthened the position of the lines with which it made contracts by giving these lines two powerful business-creating sources to draw upon, the Post Office Department for mail, and the American Railway Express system for freight traffic. It was a development of importance, not only to the lines which held these express contracts, but to the whole air transport system of the United States.

The establishment of this service may be credited to the wisdom and farsighted policy of Mr. Robert E. N. Cowie, the President of the American Railway Express Company. To the Aeronautical Chamber of Commerce must be credited their work in introducing Mr. Cowie to aviation interests in 1921 and to their continued efforts in connection with the development of all aspects of aeronautics, particularly air transportation.



Airplane Miles Flown in Transport Operations on Regular Schedules throughout the year in the United States and other Leading Countries of the World.

Aerial Passenger Transport

Aerial passenger carrying on air transport lines in this country has been a matter of slow development. As originally organized in the United States, air transport was not equipped to carry passengers, but was limited to mail and express.

In order that passenger traffic may be properly handled, specially designed planes and certain special ground facilities must be provided for the comfort of passengers. Accordingly, with a few exceptions, American air transport lines have usually handled passenger traffic as an accommodation in emergency. In spite of the above, the strictly freight and mail routes which made no effort to build up passenger service, were frequently taxed to the limit by the demand for passenger transportation. The general trend in air transport now is toward the addition of passenger services to mail and freight traffic.

Last year many of the strictly mail and express air transport lines gave careful consideration to the problems involved in passenger transportation, with the result that before the year was ended, a number of these companies definitely established or extended their operations to provide for the development and growth of passenger business.

Western Air Express

Western Air Express, Inc., carried passengers throughout 1927, in addition to its regular mail and express, operating between Los Angeles, California, and Salt Lake City, Utah. This route is 600 miles long, and the fare between the two terminals is \$60.00, with baggage allowance of twenty-five pounds; excess baggage 50 cents a pound. Planes leave Los Angeles at 7:35 A. M. and arrive at Salt Lake City at 3:30 P. M. Southbound, the plane leaves Salt Lake City at 9:10 A. M. and arrives at Los Angeles at 5:35 P. M.

During 1927 the Western Air Express carried 400 passengers over this route the monthly traffic being as follows: January, 21; February, 15; March, 17; April, 13; May, 42; June, 40; July, 55; August, 60; September, 37; October, 37; November, 30, and December, 27.

This company is preparing an expansion of its passenger service, and during the spring of 1928 will inaugurate a daily passenger schedule between Los Angeles and San Francisco with tri-motored Fokkers, each of twelve passenger capacity. It is to be a three hour service, the plane to leave each terminal at 10:30 A. M. and to arrive at each destination at 1:30 P. M. The company will also

open its Cheyenne, Denver, Colorado Springs, and Pueblo, Colo., mail and express line to passenger service in the spring of 1928.

Boeing Air Transport

When the Boeing Air Transport, Inc., took over the operation of the air mail service between Chicago and San Francisco on July 1, 1927, a boon was conferred on the trans-continental traveler, who wanted to reach his destination in the East more quickly than is possible by railway, or who wanted to avoid the long tiresome 80 hour trip from the Pacific Coast to the Great Lakes.

From the beginning of its operations Boeing Air Transport, Inc., carried passengers as well as mail and freight, and in its six months' operation during 1927 transported a total of 525 passengers over 357,494 passenger miles, at the following rates per passenger:

Between San Francisco and Chicago \$200; Iowa City \$193; Des Moines \$181; Omaha \$167; North Platte \$140; Cheyenne \$118; Rock Springs \$88; Salt Lake City \$68; Elko \$47; Reno \$23; Sacramento \$11.

Between Chicago and San Francisco \$200; Sacramento \$200; Reno \$191; Elko \$167; Salt Lake City \$146; Rock Springs \$126; Cheyenne \$96; North Platte \$74; Omaha \$47; Des Moines \$33; Iowa City \$21.

Between Sacramento and Reno \$13; Elko \$37; Salt Lake City \$58; Rock Springs \$78; Cheyenne \$108; North Platte \$130; Omaha \$157; Des Moines \$171; Iowa City \$183.

Between Reno and Elko \$25; Salt Lake City \$46; Rock Springs \$66; Cheyenne \$96; North Platte \$118; Omaha \$145; Des Moines \$159; Iowa City \$147.

Between Salt Lake City and Rock Springs \$21; Cheyenne \$51; North Platte \$75; Omaha \$100; Des Moines \$114; Iowa City \$126.

Between Rock Springs and Cheyenne \$31; North Platte \$53; Omaha \$80; Des Moines \$94; Iowa City \$106.

Between Cheyenne and North Platte \$23; Omaha \$50; Des Moines \$64; Iowa City \$76.

Between North Platte and Omaha \$28; Des Moines \$42; Iowa City \$54.

Between Omaha and Des Moines \$15; Iowa City \$27.

Between Des Moines and Iowa City \$13.

The schedule which is the same as that of the air mail is as follows: Westbound—Leave Chicago 7:50 P. M., Iowa City 9:40 P. M., Omaha 12:35 A. M., North Platte 2:00 A. M., Cheyenne 4:45 A. M., Rock Springs 7:05 A. M.; Salt Lake City 9:20 A. M., Elko 11:15 A. M., Reno 1:45 P. M., Sacramento 2:45 P. M., Oak-

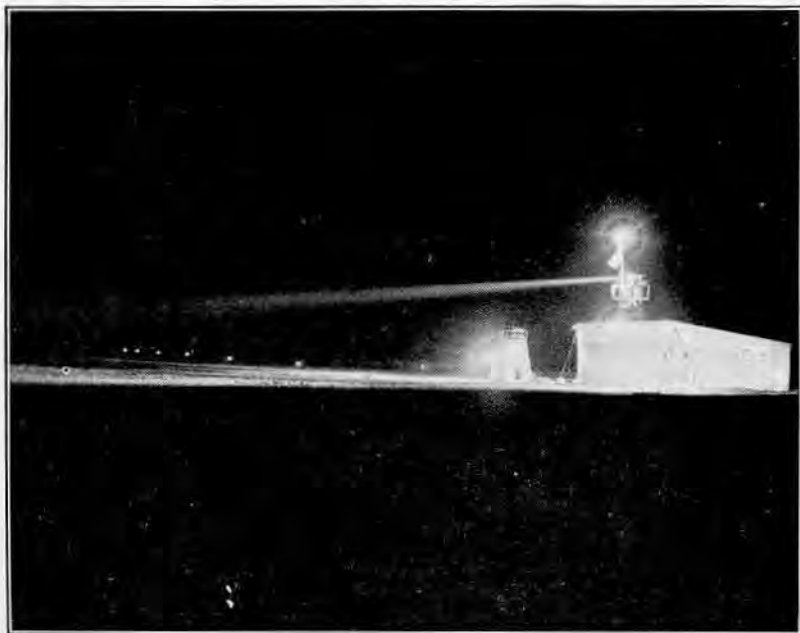
land 4:30 P. M., arriving at San Francisco 5:30 P. M. Eastbound—Leave San Francisco 6:00 A. M., Oakland 7:00 A. M., Sacramento 7:45 A. M., Reno 9:00 A. M., Elko 11:00 A. M., Salt Lake City 3:05 P. M., Cheyenne 7:30 P. M., Omaha 12:30 A. M., Des Moines 1:30 A. M., Arriving at Chicago 5:45 A. M.

During 1927 the equipment of the Boeing Air Transport, Inc., comprised comfortable inclosed cabin, single motor Boeing planes, equipped with Pratt & Whitney "Wasp" 410 H. P. engines. Plans for the 1928 passenger service call for an addition of three trimotored Boeing passenger planes, with cabins de luxe, each capable of carrying 12 passengers.

The passenger operations during 1927 covered 357,494 passenger miles and were without an accident. Of the 306 trip schedules to be flown, only 17 were uncompleted, a remarkable record considering the November and December weather over the Rocky Mountains.

National Air Transport

This company operated a test service between Dallas and Chicago in September, 1927, and during the month 168 passengers were



Oklahoma City Lighted Airport, showing National Air Transport Hangar.

carried. The total passenger mileage during the month was 68,000. As a result of these preliminary test flights with passengers, National Air Transport has entered upon regular daily passenger service between Chicago and Kansas City, using Travel Air cabin monoplanes with accommodations for three passengers, besides mail and express.

This passenger service operates on the following schedule: Westbound—Leaves Chicago 7:30 A. M., Moline 9:30 A. M., St. Joseph 12:50 P. M., arrive Kansas City 1:25 P. M. Eastbound—Leaves Kansas City 2:05 P. M., St. Joseph 2:40 P. M., Moline 5:30 P. M., arrives Chicago 7:30 P. M.

This schedule makes connection with the trans-continental Air Mail service.

The rates charged are as follows: Between Chicago and Kansas City \$62.50; Chicago-St. Joseph \$56.75; Chicago-Moline \$26.00; Moline-Kansas City \$44.50; Moline-St. Joseph \$38.75; St. Joseph-Kansas City \$13.75. Passenger stations are located at the airports of the cities on this route.

For some time, National Air Transport, Inc., has carried a limited number of passengers on its day route between New York and Chicago, purely as an accommodation to meet emergency needs of travellers. Passenger tickets were restricted as follows: (1) One passenger per trip, provided there is no interference with mail or express to be carried; (2) At any point along the route, the pilot to have authority to replace a passenger with express or mail or to decline further passage if weather conditions are unsatisfactory.

Notwithstanding these restrictions, the demands for accommodation were so great that the fare between New York and Chicago was raised to \$200, and between Cleveland and Chicago or New York to \$100, in order to reduce the demands for passenger transportation to a minimum. Notwithstanding these restrictions, National Air Transport in 1927 flew 105,000 miles with pay passengers.

This limited passenger accommodation operates on the following schedule: Westbound—Leaves New Brunswick at 12:15 P. M., Cleveland at 3:35 P. M., arrive Chicago at 7:00 P. M. Eastbound—Leaves Chicago at 8:00 A. M., Cleveland at 11:00 A. M., arrive New Brunswick at 4:45 P. M. No passengers are carried on the night flights. Baggage up to twenty-five pounds is allowed each passenger; excess baggage \$1.00 a pound.

Colonial Air Transport

Colonial Air Transport, Inc., operating between Boston and New York and between Buffalo and Cleveland, is developing a suc-

cessful passenger service. During 1927, passengers were carried only on the Boston-New York route, but the 1928 program of the company provides for an increase of passenger equipment and an intensive development of passenger traffic over all its lines. The 1927 business of the company, in addition to mail, express and passengers on the scheduled trips between Boston and New York also included short sight-seeing trips about New York City on Saturdays and holidays. The company carried 509 passengers on the regular Boston-New York runs, and 3,507 passengers on its short sight-seeing trips.

The passenger rates are as follows: Between New York-Boston \$35.00; New York-Hartford \$20.00; Hartford-Boston \$20.00. The Boston-Hartford round trip is \$35.00. Each passenger is allowed thirty pounds of personal baggage. The equipment consists of single motor Fokker "Universal" cabin planes powered with Wright "Whirlwind" engines, and have a capacity of four passengers per plane. Tri-motored planes were used for the short sight-seeing trips, each having a capacity of ten passengers. The fare for the short trips was \$5.00 per passenger.

The schedule of the New York-Boston line is as follows: Southbound—Leave Boston 6:15 P. M., arrive at Hartford 8:30 P. M., arrive at New Brunswick, New Jersey at 9:15 P. M. Northbound—Leave New Brunswick 6:00 A. M., Hartford 7:30 A. M., arrive at Boston 9:05 A. M. Stops are made at Teterboro Field, Hasbrouck Heights, New Jersey, on signal.

Pacific Air Transport

On the Western coast, Pacific Air Transport, Inc., operates a combination mail, freight and passenger service over 1,099 miles of route from Los Angeles to Seattle, in both directions daily. During 1927, this route carried 1,252 passengers, the traffic by months being: January, 2; February, 13; March, 22; April, 45; May, 75; June, 178; July, 208; August, 216; September, 213; October, 170; November, 47; December, 63.

The passenger rates are: Seattle-Portland \$12.00; Seattle-San Francisco \$80.00; Seattle-Los Angeles \$125.00; Los Angeles-San Francisco \$45.50. Baggage up to twenty-five pounds per passenger is allowed.

The flying schedule is as follows: Southbound—Leave Seattle 2:00 P. M., Portland 7:00 A. M., Medford 9:30 A. M., San Francisco 1:15 P. M., Fresno 3:15 P. M., Bakersfield 4:45 P. M., arrive Los Angeles 6:15 P. M. Northbound—Leave Los Angeles 1:20 A. M., Bakersfield 1:30 A. M., Fresno 3:00 A. M., San Francisco

5:00 A. M., Medford 9:00 A. M., Portland 11:30 A. M., Tacoma 1:30 P. M., arrive Seattle 2:00 P. M.

At the close of 1927, the controlling interest of this company passed into the hands of the Boeing Air Transport, Inc., with the result that there has been a substantial increase of working capital, and it is announced that the equipment of the route will be increased by four 6-passenger Boeing cabin planes, powered by Pratt & Whitney 425 H. P. "Wasp" engines. The management of the Pacific Air Transport remains unchanged.

The Maddux Air Line

This company operates a schedule service for passengers between Los Angeles and San Diego, California. Since July 21, 1927, when operations began, the line carried 1,400 passengers, the number carried by months being: July (9 days) 128; August, 228; September, 264; October, 192; November, 304; December, 284.

The schedule is as follows: Southbound—Leave Los Angeles daily 10:30 A. M., arrive San Diego 11:45 A. M. Northbound—Leave San Diego daily 3:00 P. M., arrive Los Angeles 4:10 P. M.

The fare is \$15.00 per passenger. The equipment consists of two tri-motored twelve-passenger Ford planes, powered with Wright "Whirlwind" engines.

Pacific Marine Airways

Another purely passenger line on the Pacific Coast is the Pacific Marine Airways, which for six years has been operating a passenger service from Los Angeles harbor to the Catalina Islands. Leaving Wilmington (port of Los Angeles) at 10:30 A. M. daily, and arriving at Avalon at 11:00 A. M., the return trip is made from Avalon at 3:45 P. M., arriving at Wilmington at 4:15 P. M. During the summer, a double daily service is maintained. A total of 4,200 passengers were carried in 1927. The fare is \$12.50 one way, and \$20.00 for the round trip.

Stout Air Services

Out of Detroit, the Stout Air Services, Inc., operated a freight and passenger service from January 1 to July 31, between Detroit and Grand Rapids, Michigan, carrying 1,287 passengers. The service was discontinued after July, and in its stead there was established Nov. 1, 1927, a double daily passenger and freight service between Detroit and Cleveland. This service is supported by ample equipment, consisting of four Ford-Stout monoplanes, two equipped with single motors, Liberty 12, and two of the planes with three Wright



(Top) Advance Aircraft Co. "Waco Ten." Engine, Curtiss OX-5.
 (Bottom) Advance "Waco." Engine, Fairchild "Caminez."

"Whirlwind" engines. The planes are closed cabin planes and heated for winter flying.

During seven months' operations between Detroit and Grand Rapids the service completed all except eleven trips scheduled. It carried 1,287 passengers and 2,809 pounds of express. In the flying of the Detroit-Cleveland route 181 out of 204 trips were completed. This route during November and December, its first two months of operation, carried 688 passengers and 2,506 pounds of freight.

Aero Corporation of California

A three times a week passenger and express service was started by the Aero Corporation of California in November, 1927, between Los Angeles and Phoenix and Tucson, Arizona. Under its schedule, the plane leaves Los Angeles on Monday, Wednesday and Friday at 10:00 A. M., P. T., arriving at Phoenix at 3:30 P. M., M. T. and at Tucson at 5:00 P. M., M. T. Westbound—The plane leaves Tucson at 8:00 A. M., M. T., Tuesday, Thursday and Saturday, arriving at Phoenix at 9:25 A. M., and at Los Angeles at 1:30 P. M., P. T.

The passenger rates are: Los Angeles-Phoenix \$47.50; Los Angeles-Tucson \$60.00; Phoenix-Tucson \$12.50.

The express rates per pound are: Los Angeles-Phoenix \$1.30; Los Angeles-Tucson \$1.60; Phoenix-Tucson 50 cents.

The equipment of the Aero Corporation of California consists of two Fokker single engine planes powered with Wright "Whirlwind" engines, and seven Eaglerock planes powered with OX5 Curtiss engines. During the month's operation in 1927 the company carried 61 passengers.

Aerial Service

The year's progress in the field of aerial service is clearly revealed in a survey made by the Aeronautical Chamber of Commerce of America immediately after the close of the year 1927.

The result of that survey is illuminating. A distinct improvement in the situation is evidenced by the fact that though the returns show many small operators eliminated, they also show more modern planes and modern engines in service. There is a somewhat smaller number reporting for 1927 than for the previous year, and there is also a smaller number of planes accounted for than in 1926. This reduction in the number of planes is accounted for principally by the gradual wash out of war-time material. On the other hand, the reports also show that the number of passengers carried and the



(Top) Alexander "Eaglerock" Long Wing. Engine, Curtiss OX-5. (Center) Alexander "Eaglerock." Engine, "Whirlwind." (Bottom) Alexander "Eaglerock" Combination Wing. Engine, Curtiss OX-5.

number of miles flown were greater than in 1926. This means that more passengers per plane were carried and that the planes flew more hours per day, a healthy situation from the standpoint of revenue production. The following comparison illustrates the situation:

	1927	1926
Operators reporting	357	420
Number of airplanes in service	710	969
Number of miles flown	8,471,517	7,656,492
Number of passengers carried	463,367	380,201
Pounds of express carried	241,300	182,508

The figures given above cover only the miscellaneous aerial service companies and do not include the freight, passenger and mail traffic or the mileage of the transport lines operating on fixed schedules; nor does the freight include the million and a half pounds of insecticides carried by airplane in crop dusting operations.

While the survey reveals a gratifying reaction on the part of the public toward all flying activities and a general permanent improvement in this field of aerial activity, it also gives occasion for serious consideration of the conditions which face some of the aerial service operators. The outstanding points revealed by the survey are the following:

1. Marked elimination of the old surplus war planes and their replacement by new machines built by recognized manufacturers using war surplus motors.
2. Elimination of certain operators and discontinuance of services in unprofitable territory.
3. Serious lack of appreciation by many of the operators of the economic aspects of their business.
4. Absence of accurate, simple records, such as hours of flying, or of passengers or freight carried.

The reports of the aerial service operators, which constituted practically all of American commercial aviation prior to the comparatively recent establishment of our air transport systems, when grouped according to different kinds of services, reveal much that is interesting and clearly indicates the scope and nature of this most important part of our aeronautical development.

Short Trip Passenger or Taxi Services

The survey of the short trip passenger or taxi services discloses a state of affairs similar to the chaotic beginning of the develop-

ment of the business of the automobile, bus and taxi operators in this country, when such ventures were operated in many cities at such low rates that they were forced to suspend and reorganize. It demonstrates, as C. M. Keys, Chairman of the Board of the National Air Transport, Inc., said in regard to the entire field of air transportation, "Air transportation is a traffic problem rather than an operating problem."

This situation is deserving of attention because the survey reveals that a large percentage of the total number of planes in use are equipped with war-time motors of types no longer in production and which will soon be unobtainable. It stresses the importance of placing aerial service operations on a basis where they become sufficiently profitable to provide the accumulation of funds for the replacement of low-priced equipment using war surplus motors, by planes with more modern power plants, at prices commensurate with the cost of post-war production.

Of the 343 aerial service operators reporting rates and volume of business 2.3 per cent show a rate of \$1.50 per passenger per "hop," and 17 per cent report a rate of 20 cents or less per mile for long flights. The flights and passengers reported barely reach an average of 1½ passengers per flight. All experience points to the fact that such rates are ruinous to the operator. They cannot more than meet charges for gasoline, oil and other current direct expenses, plus a small wage to the operator, who in most cases, is the pilot. Such rates can leave nothing for replacements of motors or planes, which accounts for some of the reports reading tersely and tragically: "No operations. Ship worn out."

Thirty-five per cent of the operators reported a rate of \$2.50 per passenger, for short trips, and 34 per cent reported rates of from 20 to 25 cents per mile for long flights. These operators are on a sounder basis, but even these rates will hardly build up a fund against the day when the old war-surplus equipment goes to the scrap heap.

Of the total number of operators reporting, 58 per cent charge from \$3.00 to \$5.00 per "hop," while 25.8 per cent report a per mile rate of 50 cents, and only a very few a per mile rate ranging from 75 cents to \$1.00 per hour. A few charge as high as \$75.00 per hour, but on the other hand, some as low as \$15.00 per hour.

Ruinous rates in the aerial service field are unnecessary. As not every community can furnish sufficient volume of business to support aerial service, operators should not hesitate to shift operations from an unprofitable to a more productive community. In any event, the people must be educated to the utility of aircraft, and

the business will be practicable only when they pay rates yielding a profit.

Aerial service as a business venture is still in a state of flux, but checking the reports of the 1927 survey against those of 1926 shows that the situation is gradually improving through the gradual elimination of insufficiently financed or impractical operators; some im-



Buhl "Airsedan. Engine, "Whirlwind."

provement in business methods; the substitution of better equipment, and the broadening of the flying activities to something of more practical value than ten-minute joy "hops" at \$1.50 per flight.

Scenic Tours and Industrial Aerial Services

While the short trip passenger-carrying phase of aerial service is going through a process of finding itself, the more pretentious touring activities and such distinctive commercial work as photography, mapping, surveying, crop dusting, aerial advertising, etc., made solid progress in 1927.

The business of scenic tours during the year met with considerable success and seems now well established in various parts of the country. So marked has been the development that it is not feasible to describe all these activities, but a few illustrations of scenic air touring will suffice to indicate the character and extent of this field of aerial service.

In the East, for instance, the Aerial Service Corporation operates

out of Hammondsport, N. Y., a 150-mile tour over the "Finger Lakes" section of the picturesque New York highlands, a journey that a party of two can make for \$20.00 per passenger.

Out of Washington, the Potomac Flying Service operates tours into the historic region of Gettysburg, Pa., traversing the routes of the two contending armies and over the field of this great battle of the Civil War. This trip costs but \$3.00 per passenger.



West Indian Aerial Express. Keystone "Pathfinder." "Whirlwind" engines.

In the far South the Rogers Air Lines, which during the summer operate in the Lake George, Lake Placid and Thousand Islands regions, conduct during the winter months, scenic excursions from Florida to the Bahamas and Cuba.

In the Middle West the Parks Air Lines of St. Louis, features a seventy-mile sight-seeing trip over the Mississippi river and surrounding country, which a party of two may take at a cost of \$12.50 per person.

Out of Detroit, the Wayco Air Service takes tourists on sight-seeing trips "anywhere, any time."

In the Yellowstone region, the National Parks Scenic Airways

operates tours out of Billings, Mont., which cover the whole Yellowstone country. A similar scenic service has been in operation for some time in the Mt. Ranier Park district.

On the Pacific Coast the Maddux Air Lines, and Pacific Marine Airways, the Aero Corporation of California, at Los Angeles, and the Breese Flying Service, at San Francisco, among others, operate successful scenic tours in the West Coast section.

General Aerial Service Operations

The general activities in the field of Aerial Service covering nearly 400 operators are reflected in the listings of Aerial Service Operators by states and cities in the Appendix of this volume. It is impossible to give the detailed activities of all of these operators, but as a study of the magnitude and character of operations of the many well-established Aerial Service Organizations in the United States, the following summary of the work of the Curtiss Flying Service during 1927 will prove interesting:

Curtiss Flying Service at Garden City, N. Y., had the most successful year in its history, doing about twice the volume of business that was done in 1926.

The Company's record for the year shows a total flying time of 4,169 hours, which amounts to the imposing total of 320,000 miles as compared to about 175,000 miles in 1926. This total flying time was divided as follows:

Instruction	1,634 hours
Passenger Flights	804 "
Photography	350 "
Cross-Country	731 "
Student Solo	164 "
Testing and Miscellaneous	485 "

During the year the Curtiss Flying Service carried slightly more than ten thousand passengers, an increase of more than 100 per cent over the number carried in 1926. Students enrolled during 1927 numbered 310 and of these 224 soloed, as compared to 95 in 1926. The total revenue for the year is reported as just short of a quarter of a million dollars.

The Curtiss Flying Service purchased ten new airplanes during the year of which four were closed cabin Fairchild monoplanes particularly desirable for cross-country passenger transportation and for photography. Eighteen planes were operated during the year.

The unusual flights undertaken during the year included many emergency passenger flights to distant points, including Florida, Chicago and elsewhere. Aerial photographs were taken of the

Atlantic Fleet in New York Harbor, of the departure of several trans-Atlantic flyers, of an experimental smoke screen laid down around the liner "Ile de France" and other events. Hundreds of miles of aerial mapping was done by this organization including an aerial survey of a new highway along the Hudson River and water supply facilities in the metropolitan area. One of the most interesting items was a series of flights over the flood area in New Eng-



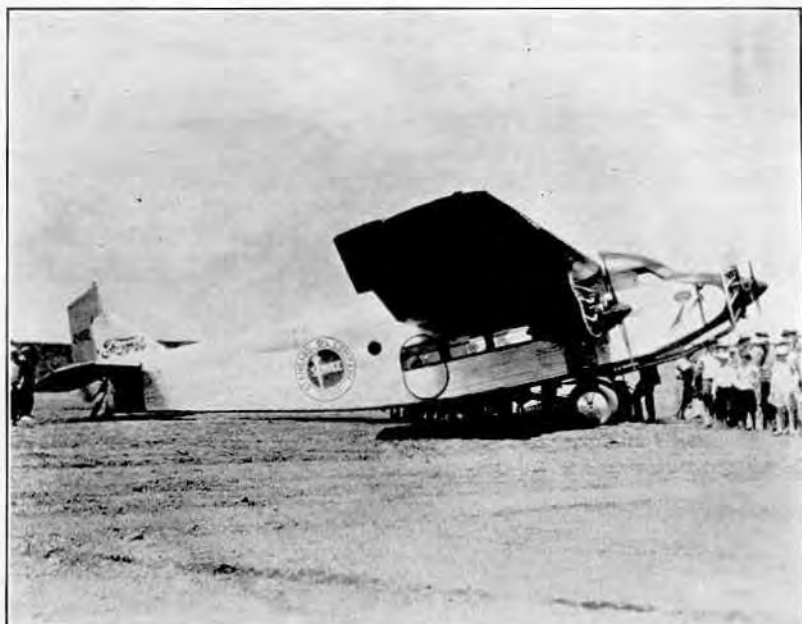
Fairchild All Purpose Airplane. Engine, Wright "Whirlwind."

land in November by which observers brought back authentic reports and photographs of the damage done in that area.

With the assurance that the interest in commercial flying will continue, this Company is enlarging its activities for the coming year and its new program calls for improvements in Curtiss Field, enlarged offices, new flying equipment and increased personnel.

Flying in Connection with Private Business

All commercial flying in 1927 was not done by Aerial Service and Transport operators. Of the 343 reports received, approximately 10 per cent are using their equipment almost exclusively,



(Top) Standard Oil Co. of Indiana, Ford Tri-motor. Engines, "Whirlwind."
 (Bottom) Royal Typewriter Co. Air Truck, Ford Tri-motor.
 Engines, "Whirlwind."

either in the advancement of their own business, or for pleasure, with a negligible amount of revenue from passenger or express.

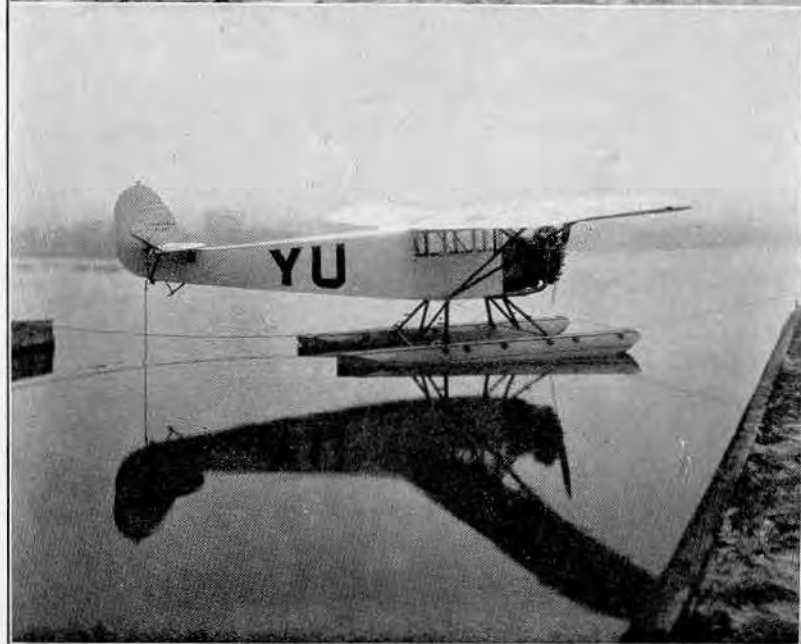
In operations of this character, accurate account of hours or mileage flown, was not always kept, but of the 34 operations of this class, 15 report an aggregate of 197,858 miles of flying, and 9 report a total of 560 passengers carried.

One of these operations which has attracted much attention is that of the A. W. Shaw Co. of Chicago. This progressive organization put into service a Stinson cabin monoplane powered with a 200 H. P. Wright "Whirlwind" engine. The plane is used to facilitate R. L. Putnam, Vice-President of the Shaw organization, on business trips in their nation-wide business activities. The entire operations are being carefully logged as to expense and performance and this information is published monthly for the advantage of other commercial institutions which may be considering the utilization of aircraft to meet similar travel problems.

"Like hundreds of other businesses, large and small, the problem of transportation is a vital one with us," says the company in its publication, *The Magazine of Business*. "Business moves fast these days, and the time of a major executive is very valuable. In the past, executives have been limited to as much travel as available transportation facilities have permitted in a given number of hours. The airplane seemed to offer a faster and more flexible mode of transportation, a means of travelling from Chicago to Cleveland for example, in a little over three hours, whereas by train, the trip requires approximately eight hours. At this rate, in a single day, if necessary, an executive might visit Cleveland, Akron, Canton and Buffalo, or as many other cities in a different direction."

Up to the close of 1927, a four-month period, the Shaw plane had travelled over 12,000 miles. It had visited most of the leading cities between Chicago and New York, including Cleveland, Akron, Detroit, Cincinnati, Buffalo, Syracuse and Albany. It had also visited other cities, including Washington, Boston, Milwaukee, New Haven, Louisville, Norfolk and Richmond. Many of these cities were visited several times.

A strictly individual commercial service of a similar character is reported by the Duplex Printing Press Company of Battle Creek, Mich. Their service, which has stood the test of two years, was inaugurated for the quick delivery of mechanical equipment to newspapers and others, and also for the transportation of officials of the Duplex Printing Press Company, when time is an important factor. It is purely a private service operation, and is conducted by the Duplex Air Service, an adjunct to the Duplex Printing Press



Fairchild Cabin Monoplane as a Land and Seaplane.
Engine, Pratt & Whitney "Wasp."

Company. Its original equipment consisted of a Swallow airplane with a Curtiss OX-5 motor. The company reports that 6,000 miles were flown with printing press parts, and officials and mechanics of the company, during 1927. The equipment of the company has been increased by an additional Waco No. 10 and a Waco No. 9 airplane, and it is stated that a limited amount of outside commercial flying will be done.

Other notable instances of the employment of the airplane by corporations to meet their own travel needs, are furnished by the Continental Motors Company of Detroit, the Marmon Motor Car Co., of Indianapolis. The equipment of the Continental Motors Co. is a tri-motored Fokker, which has taxied more than 10,000 miles between the company's plants in Muskegon and Detroit.

For some years, the airplane has been utilized to meet the requirements of the oil industry, particularly, in the oil fields, but in 1927, considerable airplane mileage was made in connection with the travel of executives and sales officials of some of the principal oil companies. A statement issued by the Standard Oil Company of Indiana discloses that last year directors of that company travelled 37,265 miles by airplane in connection with their duties. One of the company's machines, a Laird plane, with a "Whirlwind" engine, covered 35,000 miles during the year.

The Texas Oil Corporation announced that it will use airplanes for its executives in travelling and inspecting oil properties and operations as well as in connection with sales promotion. The Texas Oil Corporation has ordered a Ford plane equipped with two Wright "Whirlwinds" and one Pratt & Whitney "Wasp" motor.

The Phillips Petroleum Co. also has its plane, a Travel Air, which has flown 37,000 miles exclusively on company business.

All aircraft manufacturers, and a number of makers of instruments and accessories, such as Wright, Fairchild, Advance, Alexander, Keystone, Douglas, Boeing, Ford, Curtiss and Pioneer, have private air services for testing purposes, either on leased fields or fields of their own. Some confine the service strictly to their own needs, while others do a limited commercial business, usually of the cross-country character.

In the category of private flying also come such operations as that of Earl Ovington of Santa Barbara, Cal., who last year flew approximately 10,000 miles in part in connection with his real estate activities, and in part for pleasure; or like Theodore Hubbell, of Cleveland, Ohio, who made 500 trips of an average of half an hour each, principally, in connection with his business of placing insurance. Another operation, entirely private, is that of Capt. Lewis A.

Yancey, of New York, who uses two Curtiss seaplanes exclusively in experimental work, testing aircraft navigational equipment and instruments.

A private service that emphasizes the air-mindedness of the business men of Youngstown, Ohio, is the operation conducted by the Youngstown Board of Trade. This organization, through its Secretary Lynch, operated from the Municipal Airport of Youngstown a standard J-1 plane last year, and has ordered for delivery this spring



Laird Aircraft Corp. "Whippoorwill." Engine, Wright "Whirlwind."

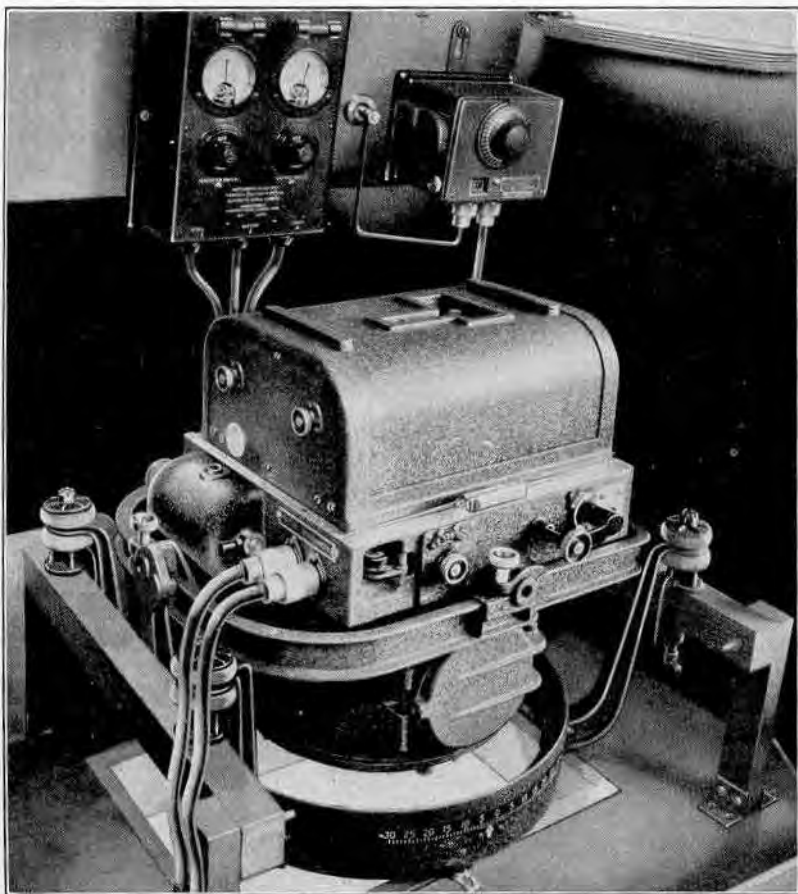
a "Monocoupe" airplane from the Central States Aero Co. of Davenport, Ia. It is a two-place cabin plane equipped with a 75 H. P. air-cooled motor of the Detroit Aircraft Engine Company. The Board of Trade advises that it maintains this operation simply for advertising the city, but that it is also available to the members of the organization desiring to make business trips. Those using the plane pay only the actual cost of operation.

The year was replete with instances of the use of the airplane in commercial work. Many of the operations were in the nature of commercial "stunts" for advertising purposes, but on the whole,

they contributed to a better understanding and a higher appraisal of the airplane as a factor in business.

Photography—Mapping—Surveying

Owing to the scattered activities in aerial photography it has been impracticable to obtain an accurate grand total of the area sur-



Fairchild Military Type K-8, Aerial Camera.

veyed, or of the volume of business transacted. The U. S. Air Corps reports a total photographic, mapping and surveying work over 48,000 square miles in a twelve-months' period. Very little of this work was performed for strictly military uses, 25,000 square

miles being aerial mapping in connection with river and harbor surveys; 16,000 square miles for the U. S. Geological Survey; 2,200 square miles for the U. S. Geodetic Survey, and 1,000 square miles for the International Waterways Commission.

Among the important uses to which aerial photography was put in 1927, was in surveying parts of the Rio Grande, Tia Juana, and Colorado rivers, for the International Waterways Commission. This commission is studying the areas on the Mexican boundary with a view to effecting an equitable division of the use of the water between the two nations. Aerial photography simplifies the work in hand with gratifying results. It consists of photographic strips five miles wide on each side of the streams, over a section 280 miles long on the Rio Grande, 40 miles on the Tia Juana, and 25 miles along the Boulder and Black Canyons of the Colorado.

Aerial photography has won its place as completely for hydrographic surveying as it has for surveying and mapping on land. It has shortened the time required for such surveys, saved money and, according to the Hydrographic Office of the Navy Department, it produced superior survey charts. Its use was found particularly effective in recent survey work on the coast of Cuba, Pearl Harbor in Hawaii, and on the coast of Venezuela.

Aerial photography each year is becoming an increasing factor in topographic mapping by the Geological Survey. In more than one-fifth of the areas under survey during the past year in Continental United States, exclusive of Alaska, the mapping was in part based on aerial photographs taken by the Air Corps, United States Army. The base maps thus afforded consists in a partial culture and drainage base, nearly complete woodland and marsh outlines, and supplemental control for the ground surveys. Such procedure promises increasing usefulness as the photographs and the methods of using them are further improved. Aerial photography in mapping is most advantageously used in well-settled areas of comparatively low relief by graphical methods. Here the tedious conduct of the usual ground surveys of roads and railroads, houses, streams, and shore lines may be practically eliminated. In areas of high relief, however, stereoscopic methods are more successfully employed.

More than 90 per cent of the aerial photographs used in topographic mapping during the past year were of the tri-lens type, but the value of single-lens photographs for the revision of culture on existing maps is well illustrated by their use on the revision of the topographic map of Washington and vicinity, which has just been completed. Here the single-lens photographs show every road and house constructed since the previous survey was made, and the only

field work necessary was where new road construction and property grading had changed the natural relief of the surface.

New methods and new devices have been adopted in the use of aerial photographs for topographic mapping by the United States Geological Survey as the new is proved to be superior to the old. The net result of using aerial photography as an aid to the older methods of survey promises not so much reduction in cost as increase in accurate detail in the maps as published for public use.

The Geographical Survey reports that it has been carrying on tests with the aerocartograph, a mechanical stereoscopic device



B. F. Mahoney Co. Ryan B-1-W Brougham. Engine, "Whirlwind."

which combines in one instrument the visual, optical, measuring and drafting systems necessary to construct topographic maps from photographs. Photographs taken at any angle from the vertical or horizontal can be used. The instrument weighs only about 600 pounds and does not take up more space than an average-sized office desk. The tests conducted have satisfied the Survey of the efficiency and practicability of the instrument and arrangements have been made to purchase one, for it is felt that if all the necessary conditions are met, the instrument is capable of making topographic

provement of aids to aviation. Its work includes research on radio aids, airway and lighting and the development of special airplane equipment to promote safety and comfort in commercial aviation.

The radio aids now being developed include directive radio beacons, marker beacons and apparatus for carrying on constant radio telephony from ground to aircraft. The operation of these aids except radio telephony requires the use of no other apparatus on the airplane than a single receiving set.

Work in lighting equipment during 1927 has covered Neon lamps and various types of lenses and reflectors used for field lighting and for running lights. The division is also studying the effect of size, shape, color and length of flash on the visibility of beacons under various weather conditions, as well as the most desirable distribution of the lights.

A special investigation is being carried on in regard to airplane fittings, including the strength of joints of duralumin and steel.

The Division is also attempting to reduce the amount of airplane noise in cabin airplanes. The first method has been by use of more efficient mufflers, and secondly by sound-proofing the cabin and lining it with absorptive material.

The production of maps of civil air routes is assigned to the Chart Division of the Coast and Geodetic Survey, in which there has been created a special section operating under the Director of Aeronautics.

The information used in the production of airway maps is derived from a variety of sources, such as the State maps and quadrangles of the Geological Survey, the post-route maps, commercial publications, and finally, a large amount of miscellaneous information secured from corporations or individuals operating aircraft, and Army, Navy and civilian pilots. After information from these sources has been compiled it is necessary to verify the compilation by actual observation on the route. Although this may be accomplished in part by flight check, it is believed that it will prove more satisfactory to send qualified engineers over the terrain by automobile to indicate, after inspection, the corrections necessary to make the map accurate and reliable for flight purposes. The 1928 mapping program contemplates work of this character.

During 1927 three maps were completed. These include Kansas City to Moline, Dallas to Oklahoma City, and Chicago to Milwaukee. The map covering the St. Louis to Chicago route was practically completed at the close of the year.

The personnel of the Aeronautics Branch, together with statistical data relating to its work, will be found in the appendix.

Post Office Department

The Post Office Department, relieved of the details of the actual operations of flying the mail through letting out this work at public bidding to private operators, has been devoting its efforts exclusively, under the direction of Second Assistant Postmaster General W. Irving Glover, to the building up of the network of privately operated air mail lines and of bringing to the attention of the public the value of the air mail service.

One of the high lights in the operation of the air mail service in 1927 was the splendid demonstration by this service of the safety of commercial operations with able pilots, good equipment and efficient ground organization, under most trying flying conditions. This is attested by the Post Office Department's record last year of a single fatality in 1,413,381 miles of day and night air transportation.

Another achievement was the steady increase in the use of the air mail by the public. This is shown by the fact that while the mileage flown by private mail route operators was practically the same in June 1926 as in June 1927, the amount of mail carried by these private lines had increased from 29,673 pounds in June 1926 to 55,026 pounds in June 1927. Another measure of the increase in the use of the air mail service is found in the Government figures showing that while the number of miles flown in carrying mail during the first half of 1927 was practically the same as the mileage flown in the last half of the year, the compensation to the operators which is based on the poundage carried, had increased nearly 50 per cent. The Government figures show that while the average revenue per mile to operators during the first half of 1927 was 58.4 cents, it had jumped to 76.9 cents during the last half of the year.

A third notable accomplishment of the Post Office Department in 1927 was the success of its night flying, which has led it to authorize a considerable additional mileage of night mail carrying by private operators. The over-night operations now in effect and to be put into effect as speedily as the additional air mail routes are lighted, aggregate approximately 2,800,000 miles per year. The night flying program includes the following services each night of the year:

Chicago, Ill. to Rock Springs, Wyo.....	1,100 miles
Boston, Mass. to New York.....	192 miles
Chicago, Ill. to Dallas, Texas.....	987 miles
Cleveland, Ohio to Louisville, Ky.....	339 miles
New York to Atlanta.....	773 miles

3,991 miles



Statue of Liberty, New York Harbor.—*Photo Fairchild Aerial Surveys, Inc.*

This night flying, formerly done by the Post Office Department, but now relinquished entirely to private mail transport companies, aggregates more than a million and three-quarter miles of flying in the year, and constitutes the greatest night air flying operation in the world.

The National Advisory Committee

The marked progress that characterized aeronautics in the United States in the past two years, made heavy demands on the National Advisory Committee for Aeronautics during 1927. In the field of research and technical investigation during the year, the committee issued 39 aircraft circulars, 49 technical notes, besides making important technical reports, and investigating for branches of the Government dealing with aeronautics.

In accordance with the policy inaugurated in 1926 of holding annual conferences between representatives of this committee and representatives of the aeronautical industry, the second general conference of this nature was held at the Langley Memorial Aeronautical Laboratory, Langley Field, Hampton, Va., on May 24, 1927. Aircraft manufacturers and operators, aeronautical trade journals and educational institutions engaged in teaching aeronautical engineering were invited to this conference, at which Dr. Joseph S. Ames, chairman of the National Advisory Committee for Aeronautics, presided.

At the semi-annual meeting of the entire membership of the National Advisory Committee, in April, 1927, attention was given to the report of the Committee of Experts on Federal Aviation at Geneva and pointed out that "civil aviation must in itself be regarded as one of the most important factors of civilization, and it is desirable that its free development should not be hampered by any consideration unconnected with the importance which that development possesses from the point of view of scientific, economic and social progress and of the improvement of communications between peoples." The committee taking note of the growth of commercial and private operation of aircraft, felt that its research program might be so formulated as to include the fundamental problems presented by the development of civil and commercial aviation.

Extensive laboratory research work was conducted during the year by the committee, and in its annual report is presented an outline of the present state of aeronautical development with emphasis on the progress in technical development under the general headings of Aerodynamics, Airplane Structures, Airships and Aircraft Engines. The committee states: "The nature and results of the funda-

mental research carried out in the various laboratories during the past year emphasize the fact that the main theoretical foundation of this science has been laid and that new advances must be more in the nature of extensions or additions to existing theory rather than new fundamental conceptions."

Patents and Design Board

The Patents and Design Board created by the Air Commerce Act of 1926, consists of Assistant Secretaries for Aviation in the Departments of War, Navy and Commerce. The board had before it last year approximately 1,000 inventions or designs.

As originally created, the board was to receive and consider inventions submitted directly to it by individuals. Congress, however, by an Act approved March 3, 1927, changed this procedure so as to limit the jurisdiction of the board in making awards to the consideration of these cases in which the National Advisory Committee for Aeronautics first made favorable recommendations. This made the National Advisory Committee a responsible agency of the Government for the final approval of applications for awards for aeronautical inventions or designs. Thus the Patents and Design Board has final decision only in those cases which received the favorable recommendation of the National Advisory Committee. This relieves the board of the burden of considering a large number of designs or inventions until their practical or potential value has been established by the prior examination.

To take care of this additional work the National Advisory Committee created a sub-committee, composed of Admiral D. W. Taylor, chairman; Dr. J. K. Burgess, vice-chairman; Capt. E. S. Land, U. S. Navy; Prof. Charles F. Marvin, and J. F. Victory, secretary.

Of the 1,000 inventions and designs received by the Patents and Design Board, about 500 were first examined and reported on by the National Advisory Committee's sub-committee. Out of this lot there were three favorable recommendations.

State Department

The story of aeronautics in 1927 is not completely told without reference to the splendid part played by the Diplomatic Corps under the direction of the State Department.

The series of brilliant world flights by American pilots during the past year called for much special attention from our diplomatic representatives in various countries. The work of Ambassador Herrick at Paris, Ambassador Houghton at London, and Chargé d'Affaires James Clement Dunn at Brussels, in connection with the

Lindbergh, Byrd and Chamberlin flights; Ambassador Hammond at Madrid in connection with the Haldeman-Elder flight, Ambassador Fletcher at Rome in connection with the Fourth Annual International Congress of Aerial Navigation, proved of great service to American aviation and also to better international relations.

Likewise, a similar service was rendered by our diplomatic representatives in Mexico, Central and South America in connection with the honors shown the Pan-American "Good-Will" flyers and Colonel Lindbergh, on their tours through those countries. Particular acknowledgment is due Ambassador Morrow in connection with Lindbergh's flight to Mexico.

Excellent service was also rendered the industry by our consular agents, supplementing the work of our trade commissioners, in gathering commercial statistics and other information on foreign aeronautical development.

However, due to the unfortunate policy of the State Department, the exportation of American aircraft and parts has been hindered by embargoes on shipments to two foreign markets.

The review of aeronautics in foreign countries, presented in Chapter X of this volume, gives an indication of the potential markets for American aeronautical equipment in Mexico and China. In both countries the great distances and general lack of facilities for practical rapid surface transportation present opportunities for aerial transport to the great and prompt improvement of economical and social conditions in those countries.

The remarkable record of the *Compañía Mexicana de Tampico* could be easily repeated in other districts in that country, and the ambitious plans for aerial transportation in China indicates that this market is being anticipated through aviation missions sent out by European governments.

With reference to the market for aircraft in China, to which the American manufacturers are practically shut off by the embargo of the State Department, Gen. D. E. Swinehart, adviser to Chang Tso-Lin, war lord of Northern China, has recently said that he often wonders "if China will not skip the age of automobiles and go directly into the age of airplanes." He predicts that it will not be long before aviation will be the "principal means of transportation in China."

The center of these activities in Northern China are at Mukden, where there is a great airport and training school. European manufacturers, not hindered by the embargo, have the field to themselves, and French planes of the Breguet type are chiefly in use. The American embargo is severe enough to practically close the market

to American aircraft industry. Selling our aviation products in foreign markets is a costly process, involving the development of prospects which can eventuate only in conditional sales, depending in the case of Mexico and China upon the consent of the State Department in each individual case. Under these conditions American manufacturers are severely handicapped in competition with European constructors whose governments place no such restrictions upon their activities, but go far towards facilitating successful negotiations through direct aviation missions with aircraft and demonstrating personnel paid for by their governments.

CHAPTER V

AIRPORTS AND AIRWAYS

PROGRESS of a substantial and highly valuable character from a standpoint of serious commercial flying has been made in the matter of laying out and lighting airports and intermediate fields to make them available for flying by night as well as by day. The specifications laid down by the Department of Commerce for the

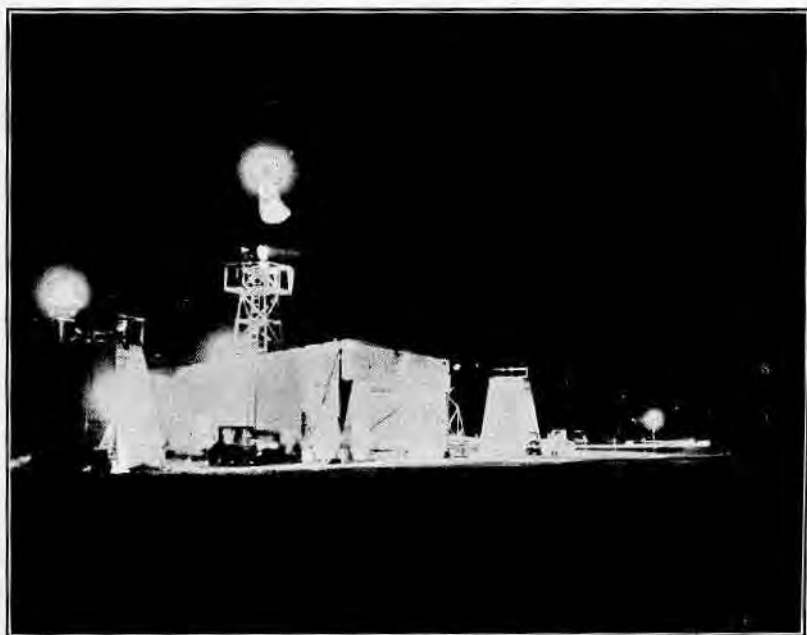


Night view from behind Westinghouse Airport Floodlight Projector at St. Joseph, Mo. Airport

various classes of airports have resulted in the improvement of a large number of old established landing fields converting them to practical air terminals, and setting a standard for the important new municipal airports which have been established within the past year.

The latter, together with the marked progress made by the Department of Commerce in furnishing lighting aid for night flying, resulted at the close of 1927 in the establishment and completion of 69 excellently lighted airports in actual operation. Those on established air transport routes were connected by a series of well defined

and lighted intermediate fields. Of the latter the Department reports 152 in operation at the close of last year. Notwithstanding this splendid showing, the development of night flying by established private operators carrying mail and express has been so great that, due to limited appropriations for this work, the Department of Commerce has been unable to keep up with the demands made upon it. A list of the lighted airports and lighted intermediate fields, constituting 2,129 miles of splendidly lighted airways, will be found further along in this chapter.



National Air Transport Night Operations on the Oklahoma City Lighted Airport.

Hand in hand with the assistance given by the Federal Government for the improvement of airports for day and night operations, has been the work of mapping the individual landing fields. Each of these comprises a plan of the field itself and a map showing the location of the field with reference to the city at which it is located. The reverse side of each map contains the full details of the field and its accommodations. Three hundred different maps of this kind were at the disposal of pilots at the close of 1927. The full list of these

landing field maps, together with lists of airway strip maps published by the Department of Commerce, as well as the maps of airports for land machines and for seaplanes or flying boats anchoring on the water, as prepared by the Hydrographic Department of the Navy Department, will be found in the Appendix of this volume.

Another interesting feature of the development of commercial aviation during 1927 has been the response of competent experienced engineers and executives trained in the management of public utility enterprises to the needs of aerial transportation.



Municipal Airport of Cleveland, Ohio.

The demands of the air transport operators for up-to-date terminals has resulted in a need for real engineering skill in the layout of airports as well as great improvement in the type of hangars and other air field buildings and appurtenances.

The evolution of the American airport from a bare open lot with a frail hangar has been slow but steady. The airport of today looks vastly different from the flying field of a few years ago. Still greater changes of an economic as well as an artistic character are in prospect. The attention by highly trained business executives, engineers

Airway Bulletin

No. 121, July 6, 1927. Published in Information Division, Aeronautics
Branch, Department of Commerce, Washington, D. C.

SYMBOLS IN AIRWAY BULLETINS

In an attempt to increase the legibility of the landing field sketches in airway bulletins and to aid in the visualization of the field there has been experimentally adopted the symbols illustrated on the reverse side of this sheet. It is believed that the use of symbols will increase the speed with which these sketches may be read, and it is obvious that the use of symbols eliminates the necessity for text, which must be highly reduced for the purpose of these drawings.

These symbols are believed to cover all present characteristics of the field. However, suggestions as to changes and additions are solicited.

Back numbers.—Back numbers of all bulletins can be furnished. Missing ones may be identified by the serial numbers.

55276—27

★ Field boundary Lights (Red-red Gn. Green, Fl. Rd. Flashing Red.)

★ Fixed beacon on tower

⊙ Rotating beacon on tower

⊞ Flood landing Light

⊞ Flood lights on hangars and buildings

→ Wind indicator

⊗ Water tower

● Oil, gas, or other tanks

⊞ High smoke stack and flag pole on building

+ Radio beacon

⇌ Radio antenna

△ Radio towers

⊙ Mooring tower

⊗ Wind mill

⋈ High transmission line

⋈ Electric power line

⋈ Telephone or Telegraph line

⋈ R.R. 1 track

⋈ R.R. 2 tracks

⋈ R.R. 3 tracks

⋈ Ry. Electric

⋈ Highway

⋈ Secondary road

⊞ City

○ Town or village

⋈ Wire fence

⋈ Board fence

⋈ Stone fence

⋈ Hedge fence

★ Light house

⊞ Church

⊗ Oil well tower

⊞ School

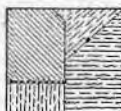
⊞ Cemetery



Woods, trees and grass



River, creek, highway and R.R. bridges



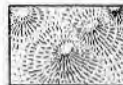
Cultivated area with wire and stone fence



Lake, pond and swamp



Ditch, grass and rough ground



Hills and mountains

and architects to the details of combining efficient express and mail operations with harmonious and comfortable facilities for air passenger traffic will result in important changes in the near future.

Strong companies have been formed in the past year and high grade engineering and architectural skill has been marshalled in the development of this new conception of air ports. The American Airports Corporation and the National Airway Terminals, Inc., organized for the creation of long chains of modern up-to-date airports, to meet the recent great strides in commercial aerial activity, are among the important developments of 1927.

AIRPORTS IN THE UNITED STATES

Municipal and Commercial Fields in operation.....	482
Municipal and Commercial Fields under construction.....	56
Army Air Corps Fields.....	538
Navy Fields.....	53
	8
Total Fields in operation.....	599
Airports, proposed.....	383

Total Fields in operation and proposed..... 982
The following is a list of lighted and unlighted airports and lighted intermediate landing fields, arranged by states:

Lighted and Unlighted Air Fields

Alabama

Unlighted Airports.—Birmingham, Mobile, Montgomery.

Arizona

Unlighted Airports.—Apache Pass, Benson, Casa Grande, Cochise, Eloy, Flagstaff, Gila Bend, Holbrook, Kingman (2), Marana, Maricopa, Phoenix (2), Prescott, Quartzsite, San Simon, Seligman, Sentinel, Stoval, Tucson, Vail, Wellton (2), Williams, Winslow (2), Yuma.

Arkansas

Lighted Airport.—Little Rock.
Unlighted Airports.—Bentonville, Hot Springs, Monticello, Pine Bluff (2).

California

Lighted Airports.—Bakersfield, Oakland, Riverside, Sacramento, San Francisco, Visalia.

Lighted Intermediate Fields.—Baker, Harvard, Hesperia, Lenwood, Mohawk, Tulare, Turlock and Verdemonite.

Unlighted Airports.—Amboy, Banning, Barstow, Beresford, Brea, Bridgeport, Burbank, Campo, Chico, Chowchilla, Chula Vista, Coalings, Concord, Corning (2), El Monte, Fresno (2), Glendale (2), Grays Well, Gridley, Hollister, Hollywood, Imperial, Jacumba (Hot Springs), Laguna Beach, Los Angeles (11), Modesto, Montague, Ontario, Palmdale, Pasadena (3), Porterville, Redlands, Redwood, Riverside, San Carlos, San Mateo, Santa Barbara (2), Santa Clara, Santa Monica, Seal Beach, Sebastopol, Stockton, University City, Venice, Visalia, Wilmington, Woodland, Yreka, Yuba City.

Colorado

Lighted Airport.—Denver.
Lighted Intermediate Fields.—Castle Rock, Dover, Fort Lupton, Greeley, Monument and Wigwam.

Unlighted Airports.—Cheyenne, Colorado Springs (3), Estes Park, Grand Junction (2), Lamar, Leadville, Pueblo, Trinidad,

Connecticut

Lighted Airport.—Hartford.
Lighted Intermediate Field.—Bethany.
Unlighted Airport.—Bridgeport.

District of Columbia

Lighted Airport.—Washington, D. C.

Florida

Unlighted Airports.—Clearwater, Daytona Beach, Fort Myers, Hialeah, Inverness, Jacksonville (2), Lakeland, Key West, Kissimmee, Miami (2), Ocala, Okeechobee, Orlando, St. Petersburg, Sanford, Sarasota, Sebring, Tallahassee, Tampa (2), Titusville, West Palm Beach.

Georgia

Lighted Airports.—Atlanta, Augusta.
Lighted Intermediate Fields.—Jefferson, Lawrenceville and Royston.
Unlighted Airports.—Athens, Macon, Savannah.

Idaho

Unlighted Airports.—Boise, Coeur D'Alene, Pocatello.

Illinois

Lighted Airports.—Chicago, Lansing, Moline, Peoria, Springfield, Rantoul.

Lighted Intermediate Fields.—Ashburn, Chesterfield, Cordova, Eliza, Fenton, Franklin Grove, Godfrey, Harvey, La Rose, Leonore, Lowder, McGirr, Mason City, Morris, North Aurora, Pekin, Plainfield, Rock Falls.

Unlighted Airports.—Aurora, Bloomington, Decatur, Elmhurst, Galesburg, Hinckley, Kewanee, Monmouth, Mt. Prospect, Rock Island, Rushville, St. Elmo, South Lansing, Sterling.

Indiana

Lighted Intermediate Fields.—Ashley, Goshen, Lakeville, Laporte, McCool, Walcottville.

Unlighted Airports.—Brazil, Fort Wayne (2), Indianapolis, Kokomo, Milan, Muncie, Richmond (2), Seymour, Terre Haute, Vincennes (2).

Iowa

Lighted Airports.—Des Moines, Iowa City, Waterloo.

Lighted Intermediate Fields.—Atalissa, Atlantic, Bloomfield, Casey, Dixon, Earlham, Fairfield, Libertyville, McCausland, Montezuma, Muscatine, Oakland, Reasnor, Williamsburg.

Unlighted Airports.—Ames, Burlington (2), Cedar Rapids, Mason City, Milford, Red Oak, Sioux City (2).

Kansas

Lighted Airport.—Wichita.

Lighted Intermediate Fields.—Oxford, Cassoday, Olivet, Olathe, Olpe, Ottawa.

Unlighted Airports.—Caney, Chanute, Independence, Kansas City (2), Liberal, Newton, Salina, Topeka.

Kentucky

Lighted Airport.—Louisville.

Unlighted Airports.—Covington, Lexington, Owensboro.

Louisiana

Unlighted Airports.—Baton Rouge, Lake Charles, Mansfield, Monroe, New Orleans, Shreveport, Tallulah.

Maine

Lighted Airport.—Portland.

Unlighted Airports.—Bangor, Brunswick, Caribou.

Maryland

Lighted Airport.—Aberdeen.

Unlighted Airports.—College Park, Frostburg, Hagerstown.

Massachusetts

Lighted Airports.—Boston, Worcester.

Lighted Intermediate Fields.—Dudley, Framingham.

Unlighted Airports.—Atlantic, Chelsea, Gardner, Lowell, South Sudbury, Taunton, Westfield, Worcester.

Michigan

Lighted Airports.—Dearborn, Mt. Clemens.

Unlighted Airports.—Albion, Anchor Bay, Battle Creek, Detroit, Grand Rapids (2), Jackson, Kalamazoo, Lansing, Marysville, Northville, Standish, Traverse City, Ypsilanti.

Minnesota

Lighted Airports.—Minneapolis, St. Paul.

Lighted Intermediate Field.—Winona.

Unlighted Airports.—Sleepy Eye, White Bear Lake.

Mississippi

Unlighted Airport.—Pascagoula.

Missouri

Lighted Airports.—Kansas City, St. Joseph, St. Louis.

Lighted Intermediate Field.—Unionville.

Unlighted Airports.—Anglum, Bucklin, Marshall, Memphis, Sedalia, Springfield.

Montana

Unlighted Airports.—Butte, Helena, Kalispell, Manhattan, Miles City, Missoula.

Nebraska

Lighted Airports.—North Platte, Omaha.

Lighted Intermediate Fields.—Benedict, Big Springs, Chappell, Dix, Elm Creek, Gothenburg, Grand Island, Kearney, Lexington, Marquette, Ogallala, Paxton, Shelton, Sidney, Ulysses, Valparaiso, Wann.

Unlighted Airport.—Lincoln.

Nevada

Lighted Airport.—Las Vegas.

Lighted Intermediate Field.—Jean.

Unlighted Airports.—Caliente, Elko, Lovelocks, Reno, Winnemucca, Yerington.

New Hampshire

Unlighted Airports.—Claremont, Concord, Lancaster.

New Jersey

Lighted Airports.—Hasbrouck Heights, New Brunswick, Trenton.

Lighted Intermediate Fields.—Stewartsville, Whitehouse, Trenton Junction.

Unlighted Airports.—Asbury Park, Atlantic City, Camden, Dover, Freehold Gloucester, Kenil, Keyport, Pine Valley, Red Bank.

New Mexico

Unlighted Airports.—Albuquerque, Cambray, Deming, Gage, Gallup, Lordsburg, Santa Rosa, Sepas, Taiban.

New York

Lighted Airports.—Buffalo, Albany, Garden City, Hempstead, Schenectady.

Unlighted Airports.—Binghamton, Brooklyn, Dansville, Elmira, Greensboro, Glens Falls, Hammondsport, Jamestown, Lake Placid, New Rochelle, New York City, Pittsford, Rochester, Syracuse, Utica.

North Carolina

Lighted Airports.—Winston-Salem, Greensboro.

Lighted Intermediate Fields.—Lexington, Mooresville, Reidsville, Stanley.

Unlighted Airports.—Asheville, New Bern, Raleigh, Tarboro, Wilmington.

North Dakota

Unlighted Airports.—Fargo, Linton.

Ohio

Lighted Airports.—Bryan, Cincinnati, Cleveland, Columbus, Dayton.

Lighted Intermediate Fields.—Elyria, Gerald, Hartford, Huron, Parkman, Solon, Vickery, Waterville, Woodville.

Unlighted Airports.—Akron, Blue Ash, Canton, Hamilton, Hudson, Mansfield, Middletown, Toledo, Troy, Youngstown, Zanesville.

Oklahoma

Lighted Airports.—Oklahoma City, Ponca City.

Lighted Intermediate Fields.—Blackwell, Criner, Edmond, Healdton, Perry, Pernell.

Unlighted Airports.—Ardmore, Bartlesville, Colgate, Enid, McAlester, Miami, Muskogee, Okmulgee, Texola, Tulsa.

Oregon

Unlighted Airports.—Albany, Dallas, Eugene, Grants Pass, Klamath Falls, Medford, Portland, Roseburg, Salem.

Pennsylvania

Lighted Airports.—Bellefonte, Philadelphia.

Lighted Intermediate Fields.—Brockville, Andreas, Clarion, Clearfield, Curwensville, Dubois, Elysburg, Hartleton, Honetown, Kennerdell, Kylertown, Lamartine, Mercer, Northampton, Numidia, Park Place, Ring Mountain, Ringtown, Stockton, Snowshoe, Stroudsburg, Sunbury, Wesley, Woodward.

Unlighted Airports.—Altoona, Bridgeville, Bristol, Erie, Essington, Gettysburg, Harveys, Hatboro, Latrobe, Lebanon, Leetsdale, Media, Mt. Union, Norristown, Parksburg, Pittsburgh, Reading, Uniontown, York.

Rhode Island

Unlighted Airport.—Providence.

South Carolina

Lighted Airport.—Spartanburg.

Lighted Intermediate Fields.—Anderson, Simpsonville, Caffney, Blackburg.

Unlighted Airports.—Columbia, Florence, Ft. Mills, Greenville.

South Dakota

Unlighted Airports.—Aberdeen, Dell Rapids, Huron, Mobridge, Pierre, Tyndall, Watertown.

Tennessee

Lighted Airport.—Memphis.

Unlighted Airports.—Chattanooga, Johnson City, Knoxville, Nashville.

Texas

Lighted Airports.—Dallas, Fort Worth, Houston.

Lighted Intermediate Fields.—Krum, Muenster.

Unlighted Airports.—Abilene, Alice, Amarillo, Angeles, Austin, Beaumont, Big Springs, Castroville, Chispa, Del Rio, Farwell, Fort Hancock, McLean, Sabinal, San Angelo, San Antonio, Sherman, Shumla, Sierra Blanca, Spur, Sweetwater, Valentine, Waco, Wichita.

Utah

Lighted Intermediate Field.—Coalville.

Unlighted Airports.—Milford, Ogden, Salt Lake City.

Vermont

Unlighted Airports.—Burlington, Springfield.

Virginia

Lighted Airports.—Richmond, Quantico.

Lighted Intermediate Fields.—Milton, South Boston, Ontario, Crewe, Amelia Court House, Milford, Quantico.

Unlighted Airports.—Arlington, Lynchburg, Newport, Richmond, Staunton.

Washington

Lighted Airport.—Spokane.

Unlighted Airports.—Bellingham, Chehalis, Hoquiam, Kennick, Longview, Parkwater, Pasco, Ritzville, Seattle, Tacoma, Walla Walla, Yakima.

West Virginia

Unlighted Airports.—Huntington, Martinsburg, Wheeling.

Wisconsin

Lighted Airports.—Madison, Milwaukee.

Lighted Intermediate Fields.—Columbus, Mauston, Summers, Portage, Sparta, Waukesha.

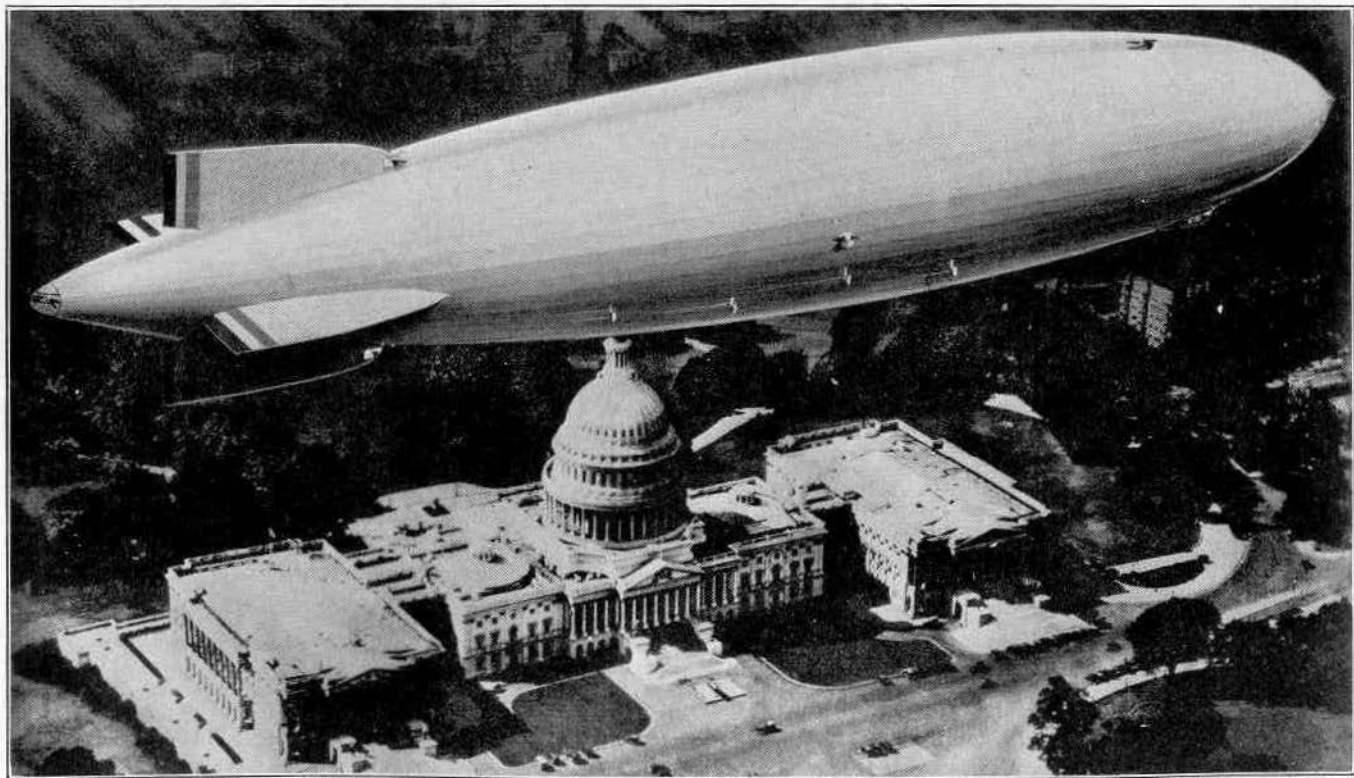
Unlighted Airports.—Green Bay, La Crosse, Menasha, Neenah, Rhinelander, Wausau.

Wyoming

Lighted Airports.—Cheyenne, Rock Springs.

Lighted Intermediate Fields.—Bitter Creek, Bosler, Burns, Cherokee, Federal, Granger, Laramie.

Unlighted Airports.—Casper, Ft. Bridger, Sheridan.



Artist's conception of 6,500,000 cubic foot Airship, from the winning design submitted by Goodyear-Zeppelin Corporation.

CHAPTER VI

AIRSHIPS AND BALLOONS

LIGHTER-THAN-AIR activities in the United States for 1927 comprise a series of notable free balloon flights in connection with the National Elimination Balloon Race and the Gordon Bennett International Balloon Race. There were record-breaking altitude flights by the late Capt. Hawthorne C. Gray of the Army Air Corps, besides some 51 flights, covering 23,488 miles, by the Navy dirigible, *Los Angeles*, and an extended cross-country trip by the Army semi-rigid *RS-1*.

Public interest naturally centered keenly on the Gordon Bennett International Balloon Race and on the National Elimination Balloon Race which preceded it.

The National Elimination Balloon Race for qualification of contestants in the Gordon Bennett International Race was held at Akron, Ohio, May 30, 1927. There were 15 entries, 4 from the Army, 3 from Navy and 6 entries by civil contestants, as follows: Goodyear Tire & Rubber Company, Akron, Ohio; Scripps-Howard Newspapers, Ohio League; Detroit Flying Club (3 entries); St. Louis Rotary Club; "Davy Tree" Expert Company, and the Akron Beacon Journal.

The National Elimination Contest was won by the Goodyear Tire & Rubber Co. V., piloted by W. T. Van Orman and W. W. Morton, who landed one mile southwest of Hancock, Maine, a distance of 718 miles.

The second position was won by the Detroit Flying Club, entry No. 3, of Detroit, piloted by E. J. Hill and A. G. Schlosser, landing eight miles west of Skowhegan, Maine, a distance of 650 miles.

The third position was taken by U. S. Army Air Corps, S261, Scott Field, Illinois, piloted by Capt. W. E. Kapner and Lieut. W. O. Fareckson, landing one mile west of Biddleford, Maine, a distance of 595 miles.

The three above-mentioned balloons thus became the American entries in the Gordon Bennett International Balloon Race.

The winning of first place in the National Elimination Race by Pilots Van Orman and Morton in the entry of the Goodyear Tire and Rubber Company V, was the fourth time Mr. Van Orman captured this event. To the winner of the National Elimination Balloon Race there has been presented each year, since 1925, the Litchfield



Entrance to Santiago Harbor, Cuba.—*Photo Fairchild Aerial Surveys, Inc., N. Y. C.*

National Balloon Race trophy, donated by Mr. P. W. Litchfield, president of the Goodyear Tire & Rubber Company and the Goodyear Zeppelin Corp. The trophy having been won three times successively by Mr. Van Orman, it became the property of the winner and has been placed in permanent possession of the Akron Chapter of the National Aeronautical Association. This trophy thus retired has been replaced by the Second National Elimination Race trophy, an artistic figure in silver on a marble base, of Mercury releasing a spherical balloon. The full list of entrants and the distances covered will be found in the Appendix.

Gordon Bennett Race

The great balloon classic of 1927 was the Gordon Bennett International Balloon Race, which started from the Ford Airport, near Dearborn, Mich., on September 10, 1927. There were fifteen entries in this race, representing eight countries. The United States was the winner of the race, with Germany second. The successful entry was the Detroit Flying Club Balloon *Detroit*, piloted by E. J. Hill, with A. G. Schlosser. It covered 745 miles. The German covered 688 miles. The entries and the distances covered will be found in the Appendix.

The winning of the Gordon Bennett International Balloon Race by E. J. Hill and A. G. Schlosser, in the Detroit Flying Club entry *Detroit*, makes the sixth race out of a total of 16, won by the United States. Next comes Belgium which has taken the trophy five times, while Germany and Switzerland have won twice each, and France once.

The American altitude record for free balloon was broken on March 9, 1927, at Scott Field, Illinois, by Capt. Hawthorne C. Gray of the Army Air Corps, when he piloted a free military balloon to a height of 28,510 feet. On May 5th Captain Gray made an altitude flight of approximately 40,000 feet, but no record was established as to save himself from being precipitated into a vast swamp, he parachuted from his balloon to safety.

On November 4th Captain Gray made his first effort to set a world's altitude record. In a free balloon, he ascended at Scott Field and reached an altitude of 42,470 feet, when he accidentally severed the tube to the oxygen tank which had kept him alive at the high altitude. His log shows that at 40,000 feet he dropped the last sand bags. The calibrating instruments showed that he had risen 2,470 feet above that mark, beating the altitude record of 34,420 feet made by two German aviators on June 30, 1921. Gray's balloon with his body was found near Sparta, Tenn. The Federation Aéronautique

International refused to recognize this altitude record on the technicality that the aviator was not in personal possession of his instruments, he having perished at a high altitude.

Military flying with balloons and airships in 1927 included the participation of an Air Corps airship for the first time in military maneuvers in this country. The ship proceeded from Scott Field to Ft. Riley on the first leg of the maneuver, where, during severely inclement weather it remained moored to a comparatively new device known as ground mooring for airships. Although the wind approached a velocity of 30 to 35 miles per hour and there were severe thunder storms, the mooring device functioned very satisfactorily. At San Antonio, Tex., near where the maneuvers were held, it participated in a simulated night patrol and one actual night patrol over the enemy lines. During the day of the combat the ship was used for the purpose of patrolling the front lines with official observers of the general staff aboard. During this operation the ship hovered over the lines at zero ground speed, thus affording the official observers an excellent opportunity to judge the action of the troops, both on the ground and in the air.

In July the Army semi-rigid *BS-1* left Scott Field, Illinois, for Langley Field, Virginia, with 1,000 gallons of gasoline on the first leg of the cross-country trip. The craft then proceeded to Bolling Field, where it took on Assistant Secretary of War F. Trubee Davison and a number of staff officers, as well as a representative of the Navy. From Lakehurst, N. J., the airship cruised to Buffalo, Cleveland, and back to Scott Field, having been 36 hours in the air since leaving Lakehurst. The *RS-1* also made a trip from Scott Field to Des Moines, Iowa, and return, and another trip to Iowa City and return.

The development of two noteworthy mechanical devices for airships were reported by the Air Corps for 1927. With a new maneuvering dolly with two cradles to permit the TC type of ship to rest in, the airship may be turned in any direction. A maneuvering winch of the caterpillar tractor type is being tried out, both for the purpose of pushing the airship in and out of the hangar, and also for the purpose of landing the airship, thus substituting mechanical for man power.

Shortage of helium caused the laying up of the Navy's dirigible *Los Angeles* for approximately six months. This situation has been materially bettered, and in the last half of 1927 the *Los Angeles* did considerable flying. The Navy announces that a program is under way for the development of a new virgin field containing enormous quantities of helium.



Governor's Palace and Plaza, Havana, Cuba.—*Photo Fairchild Aerial Surveys, Inc., N. Y. C.*

The Five Year Naval Aviation Program authorized two rigid airships of approximately six million cubic feet capacity at a total cost not to exceed \$8,000,000.

The 1928 Naval Appropriation Bill authorized the expenditure of \$200,000, limited to construction of one of these airships. Congress, for some reason which is not clear, has failed to realize the great practical advantages—including saving in cost of construction—of building two airships at the same time. Possibly this matter will be corrected by the current appropriation. No greater service to the development of airships for commercial use or for the essential needs of national defense can be made than to start at once and speedily conclude the building of these airships. In fact, unless both airships are started now they cannot be completed in accord with the Five Year Program.

An Airship Design Competition, which closed in May, 1927, was won by the Goodyear Tire and Rubber Co., whose design was superior to any other design of airship which was submitted or which has been examined by the Bureau of Aeronautics. Negotiations towards a contract for the construction of the airship which has been appropriated for are under way, and it is expected they will be brought to a successful conclusion in the near future and that the work of building the airship will be started promptly.

Progress has been made on a number of experimental projects connected with airship development which will have important bearing on the design and operation of future airships. Among the more important of these are various devices for handling airships on the ground through mechanical means; arrangements for carrying airplanes on airships; use of gasoline fuel instead of gasoline.

In Europe the rigid airship programs, which have been under way for several years, will begin to show results during 1928. It is expected that three rigid airships will be completed in the year—two in England and one in Germany. These airships are intended for international traffic. The English airships will operate on the route to India; the German airship will probably operate to South America. Before being placed in regular service it is expected one or more of the airships will visit the United States. These airship developments in Europe are being awaited with great interest by the United States.

Mooring Masts and Hangars

There are eight mooring towers and ten hangars for housing airships in the United States. The mooring towers are located as follows:

Rigid airship tower, Dearborn, Mich.; temporary rigid airship tower, Ft. Worth, Texas; rigid airship tower, Lakehurst, N. J.; non-rigid airship tower, Langley Field, Virginia; rigid airship tower, Scott Field, Illinois; temporary rigid airship towers, San Diego, Calif., and Seattle, Wash.; non-rigid airship tower, Wright Field, Ohio.

Hangars accommodating one non-rigid airship each are located at Aberdeen, Md., Akron, Ohio, and Detroit, Mich.

Large hangars are as follows: Arcadia, Calif., two airships; Brooks Field, four non-rigid and one rigid airship; Cape May, N. J., six non-rigid and one rigid airship; Lakehurst, N. J., twelve non-rigid and two rigid airships; Langley Field, Virginia, four non-rigid and one rigid airship; Scott Field, Illinois, eight non-rigid and one rigid airship; Norfolk, Va., two non-rigid; and Pensacola, Fla., four non-rigid aircraft.

CHAPTER VII

EDUCATIONAL

THE impetus given to aeronautical development in 1927 was reflected in educational and research work at a number of the leading technical colleges of the country. A more general interest in aeronautics by the student body has resulted in a large increase in the number of students taking courses leading to degrees in aeronautical engineering.

Fortunately the financial assistance given by the Daniel Guggenheim Fund for the Promotion of Aeronautics to institutions giving courses in aeronautical engineering paved the way for meeting this increased interest through the establishment of professorships and the addition of special equipment and buildings. The grants to date aggregate \$808,000 as follows:

California Institute of Technology—\$305,000; Massachusetts Institute of Technology—\$230,000; Leland Stanford University—\$195,000; University of Michigan—\$78,000. Grants to other organizations have been \$2,500 to the Society for the Promotion of Engineering Education; \$5,000 to the Royal Aeronautical Society of England; \$8,000 to the Aero Club of France and \$5,000 to the Associazione Italiana de Aerotecnica.

Looking to the air-mindedness of the younger generation, the Fund has established a Committee on Elementary and Secondary Aeronautical Education, under the chairmanship of Dean John W. Withers of New York University. This committee will seek to promote an intelligent interest in aeronautics among the students in grammar and high schools throughout the country. The educational work of the Fund also extended to the enlightenment of the general public on the subject of safety and practicability of aviation today, and to increasing public interest in the support of commercial air operations. For this purpose the Fund arranged and carried out the extended airplane tour by Col. Charles A. Lindbergh, as in 1926 it financed the air tour of the United States made by Commander Richard E. Byrd after his return from his successful North Pole flight. The Lindbergh flight covered 48 states with 82 stops, demonstrating the dependability of the airplane as a means for commercial work. It is estimated that more than 30,000,000 people saw Colonel Lindbergh and his plane on this trip.

The Fund has also given consideration to plans to stimulate

progress in aerial passenger transport in the United States. For this purpose it developed a policy of making equipment loans in the air transport field to cover the purchase of equipment for passenger traffic. The first equipment loan was made to the Western Air Express for the purchase of three tri-motored Fokker passenger planes to be operated on a model passenger airway between Los Angeles and San Francisco.

During 1927 the Fund completed and announced the details of a Safe Aircraft Competition. Under this competition the first prize



Top of Woolworth Tower, New York City, through the clouds.—*Photo Fairchild Aerial Surveys, Inc., N. Y. C.*

of \$100,000 and five other prizes of \$10,000 each are to be awarded to those manufacturers who submit an aircraft embodying the greatest advance in safe flying without sacrifice to present standards. This competition is international, and up to the close of 1927, they had received five entries from British and three from American manufacturers and designers. The committee of judges of the competition consist of Orville Wright, chairman; F. Trubee Davison, Edward P. Warner, William P. MacCracken, Jr., Commander Richard E. Byrd and Dr. George W. Lewis.

Other activities of the Fund has been the organization of a committee to co-operate with the Government in the development of improved meteorological and navigational aids; a contribution of \$5,000 to the Second Greenland Expedition of the University of Michigan for meteorological research; and the creation of a committee to co-operate with the Government in the task of finding a practical solution of flying in foggy weather.

Just how thoroughly the universities and technical schools are dealing with aeronautics, the progress they have made, and the interest of the student body is covered by the following brief summaries of reports furnished by them to the Aeronautical Chamber of Commerce. The detailed courses of study of a number of the institutions will be found in the Appendix.

Armour Institute of Technology

The Armour Institute of Technology at Chicago gives an elective course to senior and junior students on aerodynamics, under the direction of Prof. M. B. Wells, of five hours, continued through one semester. An automotive laboratory equipped with air-cooled and water-cooled engines is available for testing, research and graduate study purposes.

The course in aerodynamics is also given in the evening classes of the Institute.

The personnel engaged in aeronautical work comprises M. B. Wells, Professor of Bridge and Structural Engineering, Purdue University, C. E.; J. R. Griffith, Assistant Professor of Hydraulic and Sanitary Engineering, Purdue University, B. S. in C. E. and C. E.; Daniel Roesch, Associate Professor, Automotive Engineer, Armour Institute of Technology, B. S. in M. E.

California Institute of Technology

Students of the California Institute of Technology at Pasadena planning to specialize in Aeronautics are advised to take the under-graduate course in engineering, with some variations in the senior year, and then to continue their work in aeronautics as graduate students. All students of engineering receive the Bachelor of Science degree upon the completion of their under-graduate course. Next year the Institute will offer graduate work leading to a Master of Science degree in aeronautics. The students may also continue their work for a Doctor's degree.

The following subjects in Aeronautics will be offered in the near future: General Aeronautics; Aerodynamical Laboratory; Materials; Stress Analysis and Design of Airplane; Advanced Airplane Design;

Advanced Thermodynamics and Airplane Engines; Properties of Fluids and Elementary Hydrodynamics; Aerodynamics; Advanced Aerodynamics; Theory of Stability and Control; Propeller Theories; Wind Tunnel; and Aeronautical Seminar.

During 1927 there were four seniors and two graduate students taking the Aeronautics course.

The instruction staff in Aeronautics includes the following: Prof. Harry Bateman, and Messrs. Albert A. Merrill, Arthur L. Klein, Harvey C. Hicks, and Clark B. Millikan.

Massachusetts Institute of Technology

In 1927 there were 170 students taking courses looking to degrees in Aeronautical Engineering in the Massachusetts Institute of Technology at Cambridge. In addition, there were 111 students taking one or more subjects in Aeronautical Engineering, and 60 freshmen, 45 sophomores and 23 juniors who are candidates for the degrees of Aeronautical Engineering but have not yet begun to take professional work of the course. During the year there was one graduate as Bachelor of Science in Aeronautical Engineering and nine as Master of Science in Aeronautical Engineering. The total number of graduates of the Institute in 1927 who had taken one or more aeronautical courses was 30.

Regular instructions in Aeronautical Engineering began in 1913 under Commander J. C. Hunsaker, formerly of the United States Navy. The graduate course leading to the degree of Master of Science in Aeronautics was opened in 1914. The work of the four-year undergraduate course in Aeronautical Engineering leading to the degree of Bachelor of Science began in 1926. To date, degrees have been awarded as follows:

One for Bachelor of Science, 59 for Master of Science, 6 for Doctor of Science in Aeronautical Engineering. The Institute does not give flying instructions but Army and Navy Reserve units have been authorized and will be in operation in 1928.

The Institute carries on an extensive program of research, having a permanent research staff of six members, while most of the instruction staff devotes considerable time to research problems.

The Institute was the first educational institution on this continent to have a wind-tunnel. The original one was built before the war and has been replaced by two up-to-date tunnels. The smaller of the two is 4 feet in diameter at the working section. The maximum wind speed is 60 miles per hour. The large tunnel is 7 feet 6 inches in diameter and furnishes a maximum air speed of 90 miles per hour. The balance for measurement is of the

all wire suspension type similar to that employed at Gottingen, Germany.

Every form of testing device enters into the laboratory equipment of the Institute. The greater part of the laboratory equipment except the engine laboratory and the two wind-tunnels is housed in the Danial Guggenheim Aeronautical Laboratories. A 5-foot wind-tunnel for high air stream velocities is to be built in this laboratory.

The instruction staff of the Massachusetts Institute of Technology is composed of Prof. Edward T. Warner, absent at Washington as Assistant Secretary of the Navy for Aeronautics; Prof. C. F. Taylor, Prof. W. G. Brown, C. H. Chatfield, Daniel Sayre, Shatswell Ober, John Markham, Walter Eade, Manfred Rauscher, Edward S. Taylor. Courses in Aeronautical Engineering are given also by Prof. C. L. Moore on Theoretical Aeronautics and Advanced Wing Theory; Prof. E. A. Fales, Aero Engine Laboratory, and J. S. Newall on Airplane Design and Advanced Airplane Structure.

New York University

In the Daniel Guggenheim School of Aeronautics at New York University, of New York, N. Y., 39 students are taking the course in Aeronautical Engineering and 119 students are taking one or more of the courses in Aeronautical Engineering. There were 7 graduates in Aeronautical Engineering last year.

The courses offered in Aeronautical Engineering in the New York University are: Fundamentals of Airplane Theory and Design; Theory and Practice of Airplane Design; Aerodynamics; Airplane Engines and Installation; Aircraft Engine Design; Air Transportation; Propeller Design; Advanced Theory of Airplane Design; Advanced Aerodynamic Theory; Materials and Methods of Aircraft Construction; Elements of Navigation, Instruments and Meteorology; Advanced Dynamics of Aircraft; Theory and Practice of Airship Design.

The four-year course in Aeronautical Engineering leads to a B. S. in M. E. Graduates in Aeronautics who have been in the industry for three years and who submit a satisfactory thesis are eligible for the degree of A. E. Graduate students who have an engineering degree, or its equivalent, are eligible for the degree of A. E. after completing a one-year graduate course. Graduate students who have a degree other than in engineering are eligible for the degree of A. E. after completing a two-year graduate course.

The instruction staff in the courses of Aeronautical Engineering is composed as follows:

Alexander Klemin, Sc. M., Professor in Aeronautical Engineering; H. E. Hamilton, Associate Professor in Automotive Engineering; Otto H. Lunde, B. S. in M. E., Instructor in Aeronautical Engineering; Frederick K. Tiechmann, A. E., Instructor in Aeronautical Engineering; J. Edmund Woodman, Ph. D., Faculty Lecturer in Aviation Meteorology; Lieut. Louis Haase, U. S. N., Faculty Lecturer in Materials and Methods of Aircraft Construction; Alexander Senauke, M. E., E. E., Faculty Lecturer in Aircraft Radio; Clarence M. Young, Faculty Lecturer in Aircraft Regulations.

Purdue University

Purdue University has not, so far, conferred the degree of Aeronautical Engineer. However, those who elect the aeronautics option in the senior year in mechanical engineering are able to pass the civil service examination for junior aeronautical engineer. A number of graduates are now employed as junior aeronautical engineers at Wright Field, Dayton, Ohio, and at Langley Field, Virginia. Several are employed by airplane manufacturers as aeronautical engineers. This year 27 men are enrolled in the Aeronautics option.

The laboratories of the Gas Engine Department and the Experimental Engineering Department of the School of Mechanical Engineering and the Materials Testing Laboratory of the School of Civil Engineering are available for testing of aviation engines and airplane structures. The Gas Engine Department is equipped with electric dynamometers of 75 horsepower capacity, brakes, carburetor testing plant and other apparatus for the performance testing of gasoline engines. A new laboratory equipped with nine aeronautical engines and three airplanes will be ready in March, 1928.

Completion of the work of the junior year in the Schools of Mechanical, Civil, Electrical or Chemical Engineering is pre-requisite for enrolling in the courses in aeronautics offered in the senior year in the School of Mechanical Engineering.

At present, one assistant professor is engaged in aeronautical instruction, namely, William A. Bevan, B. S., M. S., B. S. M. E., Major A. C. Res., Assistant Professor of Mechanical Engineering.

Rensselaer Polytechnic Institute

The Rensselaer Polytechnic Institute of Troy, N. Y., announces that the fundamental principles of aviation will be taught to seniors and post-graduates in a course to be given next semester. The course will come under the general head of Mechanical Engineering and will be concerned with the fundamental principles of flying, motor construction and the like. In connection with this course a group of

students have formed the Rensselaer school, and it is expected that approximately 100 students will take the course, which will come under the general classification of Mechanical Engineering.

Prof. Grant K. Palsgrove of the Department of Mechanical Engineering will be in charge of the course.

University of California

No degrees in Aeronautical Engineering are awarded by the University of California at Berkeley, Calif., but the work in Mechanical Engineering calls for a year's course in Aerodynamics which includes a study of the fundamental parts of the machine, use of model experiments, trend of airplane advancement, airplane design, a course in internal combustion engines, and one in strength of materials. There is also a graduate course offered in special problems in aerodynamics.

During 1927, 60 engineering graduates took the course in Aeronautical Engineering.

The instruction staff in aeronautics includes Prof. B. M. Woods and John E. Younger and associates.

University of Detroit

Complete courses in Aerodynamics, Airplane Design, Meteorology, Propeller Design, Stress Analysis, Aircraft Engines, Seaplane Design, and Aerostatics Airports and Airways are offered in the curriculum of the University of Detroit, Detroit, Mich. Successful completion of five-year co-ordinative studies in aeronautical engineering consisting of 194 credit hours, of which 49 must be laboratory, are the requirements for a degree in aeronautical engineering. During 1927, 165 students were registered in this course, and 7 students expect to graduate with the degree of Bachelor of Aeronautical Engineering, this year. Work on an aerodynamical laboratory is to be begun in 1928 which is designed to offer to the student and the aircraft industry good facilities in the form of a large wind tunnel and static testing equipment.

The personnel of the instructing staff in the aeronautical courses consists of P. Altman in Aeronautical Engineering; J. L. McGeary in Aeronautical Meteorology; and R. Johnson, laboratory assistant.

The University of Detroit was one of the pioneers in establishing a regular under-graduate course in studies of aeronautical engineering leading to the degree of Bachelor of Aeronautical Engineering. This was in 1921. The aeronautical activities of the University included designing and building at the University of the Powell

Racer, winner of all light plane events in the International Air Races at New York in 1925.

University of Michigan

The University of Michigan at Ann Arbor has taken an interest in aeronautics since 1911, when Prof. Herbert C. Sadler, head of the Department of Naval Architecture and Marine Engineering, inspired the students to organize an Aero Club and advised them how to build and experiment with gliders.

In January, 1913, Prof. Felix W. Pawlowski began developing studies in aeronautical engineering, and in 1915 the University announced a regular course in aeronautical engineering available to the juniors. Shortly thereafter the regents established a degree in aeronautical engineering, the first of these degrees being awarded in June, 1916. Post-graduate courses were introduced leading to advanced degrees. Since the establishment of courses in aeronautical engineering the University of Michigan has graduated more than 100 aeronautical engineers. There are now enrolled 140 students in aeronautical engineering.

The instructing staff in aeronautical engineering in the University of Michigan comprises Felix W. Pawlowski, professor; Edward A. Stalker, assistant professor; Lawrence V. Kerber, Guggenheim professor, and Ralph H. Upson, lecturer. This staff is supplemented by a number of instructors.

With the aid given by the Daniel Guggenheim Fund for the Promotion of Aeronautics, the University is equipping its laboratory with up-to-date apparatus. This includes a wind-tunnel of the double-return type, the throat of which can be changed from 5 to 8 feet, which will enable an increase in the range of wind velocities. The maximum velocity of 8 feet will be 100 miles per hour. At present the wind-tunnel has a three component balance of the wire type with a maximum capacity of 900 pounds on the lift and 200 on the drag.

There is under construction an apparatus for the study of auto-rotational phenomena of aircraft and of the oscillations of the aircraft about its principal axes. A propeller dynamometer is being designed for experiments with propeller models of 6-foot diameter, and machines are being developed for cutting aerofoil models. With this equipment installed the University laboratory will be ready for extensive research work and commercial testing.

University of Minnesota

For some years the University of Minnesota at Minneapolis, Minn., has been giving an elective course in aeronautical engineering,

but the faculty has voted to establish next year a definite curriculum leading to a degree in Aeronautical Engineering.

The course will be four years in length. At present there are offered three courses in Aerodynamics, a general course in Aviation, a more advanced course in Aeronautical Engineering and a course in Airplane Design. The course in Aviation is conducted in co-operation with the United States Navy.

Seventy-five students are taking aeronautical courses in the University, ten of whom are working towards a degree in Aeronautical Engineering. In 1927, 15 students took aeronautical courses, and 20 took flying instructions at the Naval stations at Great Lakes and Hampton Roads.

The members of the staff directly concerned in the aeronautical course are: Prof. B. J. Robertson, Charles Boehnlein, R. M. Hazen and E. D. McKail.

University of Nebraska

The University of Nebraska at Lincoln, Neb., does not grant a degree in Aeronautical Engineering but offers as an optional group in Mechanical Engineering, courses in Internal Combustion Engines, heat treatment of metals, Aeronautical Engineering, Airplane Engine and Equipment Testing, thesis dealing with Aeronautical Subjects in Aeronautical Engine Design. In 1927, 8 students took the courses, while 12 are taking them for 1928.

The instruction staff in these courses consists of Jiles W. Haney, Professor Mechanical Engineering; P. K. Slaymaker, Professor Mechanical Design; P. A. Cushman, Associate Mechanical Engineer; C. A. Sjogren, instructor in Mechanical Engineering, and J. L. Booth, instructor in Mechanical Engineering.

University of Wisconsin

The University of Wisconsin, at Madison, Wis., gives no degree in Aeronautical Engineering, but has courses in Aerodynamics and Elementary Airplane Designing.

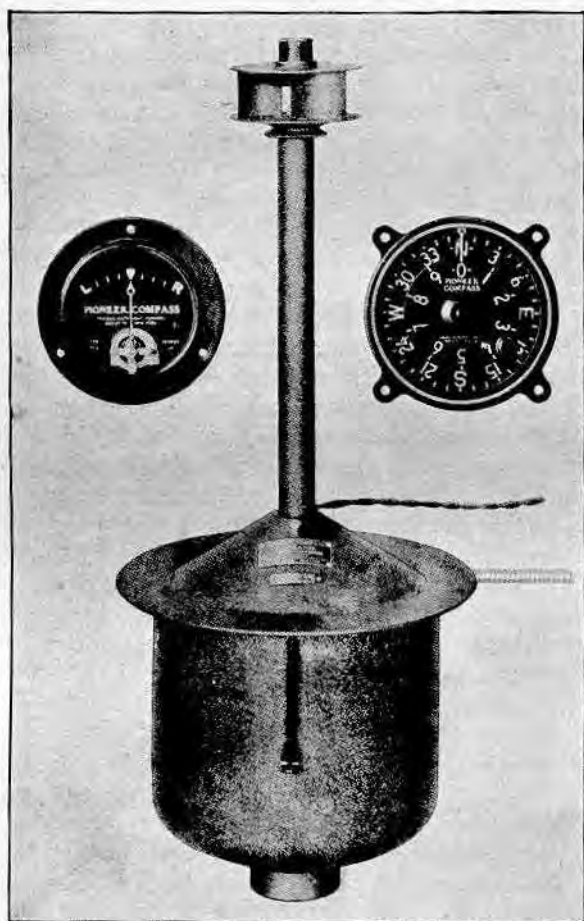
In 1927, 14 students were taking the course.

The instructing staff is comprised of Prof. E. R. Maurer and Prof. L. A. Wilson.

University of Wyoming

Although the University of Wyoming at Laramie, Wyo., has offered courses in Aeronautical Engineering for some years past, its first enrollment of students took place in 1927. The course includes Elementary Aeronautics, Aerodynamics, Industrial Combustion

Engines and Aircraft Designing, covering in all 16 credit hours of work. The University does not give a degree in Aeronautical Engineering, but teaches Aeronautical Engineering as one of the options for Bachelor of Science in Mechanical Engineering. Twenty-six students were enrolled in this course in 1927.



Pioneer Earth Inductor Compass.

The personnel engaged in aeronautical instruction is composed of Earl D. Hay, Dean of College, Professor of Mechanical Engineering; Stanley P. Hunt, Assistant Professor of Mechanical Engineering; Charles O. Koepke, Instructor in Mechanical Engineering.



Airplane view of Oxford University—Photo by Buckham.

CHAPTER VIII

FOREIGN AERONAUTICAL REVIEW

Acknowledgment is made to the Aeronautics and Communications Section, Transportation Division of the Bureau of Domestic and Foreign Commerce, of the Department of Commerce, for much of the detailed information in this chapter. The compilation of the data is based upon the best information obtainable from official and unofficial sources, comprising reports of consuls, trade commissioners, commercial attachés, individual investigators, personal correspondence and reliable trade journals.

WHILE the United States holds an important position among the countries developing civil aeronautics, there has been increasing interest and advancement in foreign countries. Research and experimental work was carried on; public interest was greatly heightened; improved schedules and equipment operated during a greater part of the year than in previous years, led to increased traffic, and greater co-operation among operating companies improved their value to the traveling and shipping public. The stability and regularity of established air services improved during 1927, and the new form of transportation made real progress toward its destined place in the world's transportation and business structure.

The International Air Traffic Association held meetings at Vienna in February and at Basel in August, 1927. The Fourth International Congress for Air Navigation was held at Rome during October. There were several other international conferences on aeronautics and several exhibitions, including an international air meet in Switzerland late in August and an exhibition at Prague earlier in the summer. The eleventh international exhibition at Paris will be held during 1928, and a large international show will be held at Berlin during the same year.

The International Chamber of Commerce recommended in May, 1927, that arrangements be made to enable travelers to purchase through air service and railway tickets. The International Railway Union has approved regulations for the forwarding of air passengers' baggage. The Luft Hansa and the German Railway Company have an arrangement for through passenger traffic, and the Swedish Air Transport Company has an arrangement with railroads in that country for forwarding goods by rail.

Africa

The year 1927 saw considerable development in commercial aviation in Africa, particularly in South Africa. Durban is the center of aviation activity in that section of the continent. The British Airways Service was organized to operate a line between Johannesburg and Durban to carry passengers, mail and freight. A subsidy of 8,000 pounds sterling a year over a period of two years has been allotted for the service, after which time the subsidy is subject to reduction. The service will be three times a week, and the travel distance between Durban and Johannesburg will be reduced from 20 hours by train to 4½ hours by air. Air taxi service has been operating for some time out of Durban.

In northern Rhodesia an aerial survey was begun and completed, covering the upper regions of the Zambesi River; sea planes were used for the work.

In French Morocco the Latécoere Line operated successfully throughout the year. This line during 1927 added passenger planes to its equipment to take care of its increased traffic between Toulouse and Casablanca.

In Belgian Congo, the Sabena Line (more fully discussed under Belgium) extended its service from N'Gula on the Katanga Railway to Elizabethville, the capital of the Katangas, thereby giving a two-day service between Boma on the lower Congo and Elizabethville.

Although the government refused to grant a subsidy for the proposed Khartoum-Kisumu Air Line, experimental flights were made with hydroplanes, for the laying out of such a route.

Albania

Three regular services are maintained by the Adria Aero Lloyd, an Albanian corporation of Tirana, which operates between Tirana and Coriza, 78 miles; between Tirana and Volona, 62 miles, and between Tirana and Scutari, 60 miles. Round trip flights are made on each service on Wednesday, Thursday and Monday. The one way fare on the three services in order is: 50, 25 and 15 lire gold.

The Italian government purchased all the shares of the Adria Aero Lloyd, October 4, 1927, and thus acquired the company's rights to an exclusive concession to operate commercial aircraft in Albania until 1935. Three Junkers aircraft were in use in the service in 1927, and two additional Junkers "J-13," single engine planes were added in December, 1927.

Argentina

Military and civil aeronautics are under the direction of two bureaus in the War Department, and naval aeronautics is regulated by a bureau in the Navy Department.

Cenience-Coronel Jorge B. Crispo is the Director of Civil Aeronautics in the War Department.

Civil aviation is regulated in accordance with an executive decree of October 4, 1926. Sanitary and customs regulations applicable to civil aircraft in international commerce are similar to those applicable to ocean vessels. The government has not entered into international agreements for the regulation of aeronautics with the exception of an agreement with Uruguay, signed in 1922.

The government appropriates 800,000 silver pesos annually for the upkeep and operation of army air stations and schools. Since 1925, 10,000,000 silver pesos have been appropriated for the purchase of flying equipment, the completion of new air stations for the army, and the building of an aircraft factory at Cordoba; 600,000 silver pesos are appropriated yearly for the upkeep and operation of naval air stations and schools. Also, 2,000,000 silver pesos have been appropriated since 1924 for a naval airstation at Mar del Plata. A large appropriation has been requested for the purchase of flying equipment for the navy. A law of 1923 requires that 250,000 paper pesos be spent by the Army Air Service for the development of civil aeronautics annually. A million silver pesos was given in 1926 for the purchase of material and the operation of a civil aviation school.

The government airplane factory at Cordoba was opened on October 10, 1927. There are eight buildings, five of which are shops, and the plant is expected to begin operation on July 1, 1928. In connection with its opening the first National Aviation Congress of Argentina was held in Cordoba on October 10, 11 and 12, 1927. Several resolutions of the Congress called for aids to aeronautics such as meteorological and other services, and for general popular support.

Several regular services between Buenos Aires and Montevideo, Uruguay, have been maintained. The latest was operated by the Junkers Mission of Germany in Buenos Aires between March 4, 1926, and October 10, 1927, when it was suspended. This route of 120 miles was served three times weekly in each direction by a Junkers "G-24" hydro-monoplane of metallic construction, having three Junkers "L-5" motors, and some smaller aircraft. The Argentine Post Office Department paid a subsidy of 4,000 pesos per month

for the first several months, and later 1,500 pesos for the carriage of mail. Passenger rates between the two cities were 50 pesos Argentine, or 20.6 pesos Uruguayan. During 1926, 230 regular flights were made on which 663 passengers, 3,278 kilograms of mail, and 2,889 kilograms of baggage were carried. Services were operated between Cordoba and Rio Cuarto and between Cordoba and Villa Dolores by the Junkers Mission, but these also have been suspended. During the period of 1925 and 1926 the five aircraft used in the services carried 3,821 passengers and 64,542 kilograms of mail on 3,403 flights covering 187,926 kilometers.

There are several aero clubs in Argentina, and that of Tucuman inaugurated a regular service between that city and Catamarca on December 9, 1927. The Director of Civil Aviation has approved the organization of an air mail service between Tucuman and Santiago del Estero in which the personnel and equipment of the aero clubs of Santiago del Estero and Tucuman will be used. The government has granted a concession for an air mail service between Paris, France, and Buenos Aires and the first flight in this service was made on November 22, 1927, from Buenos Aires to Rio de Janeiro, Brazil. A company in Spain has been granted a concession for the carrying of mail by airship between Spain and Argentina. The Aero Postal Argentino, a subsidiary of a French company, has been given the right to operate between Argentina and Paraguay.

Australia

All aviation, military and civil, is directly controlled by the Department of Defense. An air board of two flying members and one finance member is responsible for the administration of the Royal Australian Air Force, which is a separate arm of the defense forces, and this board directs both naval and military flying. All civil flying is subject to government control through the Minister for Defense in accordance with the Air Navigation Act of 1920 and regulations made in pursuance of that act. This control is regulated by the Controller of Civil Aviation whose staff is organized as a branch of the Department of Defense. Lieut.-Col. H. C. Brinsmead is Controller of Civil Aviation, Department of Defense, Melbourne, Australia.

Recent appropriations by the national government for aviation are shown by the following:

Regular appropriations: Royal Australian Air Force, \$1,568,614; Civil Aviation \$359,951.

Special appropriations: Royal Australian Air Force, \$727,542; Civil Aviation \$95,773. This is a total of \$2,751,680, against

\$1,942,964 for 1926. An increase of \$973,300 will be used for civil aeronautics during the current fiscal year.

There are 127 landing fields in Australia designated as commercial landing fields and of these 48 are called airdromes, and 77 are listed as emergency landing fields. Twenty of the fields have hangars. Only 14 are privately owned and operated.

There are three regular air transportation services in Australia. The first is operated by the Western Australia Airways, Ltd., of Perth, Western Australia. The company operates weekly in each direction over a route 1,455 miles, between Perth and Derby, Western Australia, via Geraldton, Carnarvon, Onslow, Roebourne, Port Hedland and Broome. Two and one-half days are used for the trip each way. The company has a contract with the government to operate until December 4, 1929, and its subsidies amount to 3 shillings 4 pence per kilometer. The company uses "D.H.50a" aircraft with 240 H. P. Armstrong-Siddeley Puma engine.

The second service is operated by the Queensland and Northern Territory Aerial Services, Ltd., of Longreach, Queensland. Their route lies between Charlesville and Camooweal, 825 miles, via six cities. The flight is made weekly in each direction, two and one-half days being required. De Havilland aircraft are employed.

The Australian Aerial Services, Ltd., operate three services. The first is between Adelaide and Cootamunda, 578 miles, and a flight is made in each direction weekly. Two flights are made weekly between Broken Hill and Mildura, 189 miles, and between Melbourne and Hay, 233 miles. This company also employs De Havilland aircraft. The second and third companies also receive subsidies under contracts with the government.

Several additional services are expected to be inaugurated and the government plans to ask for bids from companies willing to operate between several important business centers. One of the most important of the proposed services is that between Adelaide, South Australia, and Perth, Western Australia.

Some traffic statistics covering regular services in 1926 are included in the table:

	<i>Western Aus- tralian Airways, Ltd.</i>	<i>Queensland & Northern Ter- ritory Aerial Services, Ltd.</i>	<i>Australian Aerial Serv- ices, Ltd.</i>
Passengers	1,214	1,326	1,223
Letters (number)	252,568	24,066	11,013
Goods (pounds)	49,979	15,064	330

Number of flights, 3,267; miles flown, 417,964; hours flown, 5,466; passengers (single stage) 3,763; letters (number) 264,735; goods (pounds) 65,346.

Austria

There is no military aviation in Austria but there is a large Austrian civil air transportation company, and several companies of other nationalities operate in and across that country. The government regulates civil air transportation through its Aviation Department of the Ministry of Commerce and Transportation.

A treaty regulating civil air transportation was signed between Austria and Hungary early in 1926 and a similar treaty was signed with Czechoslovakia on February 15, 1927. A protocol regulating aeronautics in Austria was signed at Paris, October 27, 1927, by which regulations forbidding the construction of aircraft for war purposes, limiting the training of pilots, and providing for the declaration and control of the manufacture of aeronautical material, the operation of airports, and the activities of aeronautical associations, etc., are enforced.

The government granted 1,000,000 schillings for the aid of civil aeronautics for 1927 and increased this sum to 2,000,000 schillings, or \$286,000, for the year 1928. Of this latter sum 1,400,000 schillings will be used for a direct subsidy for air services and 600,000 schillings for the improvement of airports, radio and other services.

There are five important airports in Austria, at Vienna, Graz, Innesbruck, Klagenfurt and Salzburg. The Aspern field at Vienna measures 2,000 by 2,500 feet and is owned and operated by the National and Municipal governments in co-operation with private interests. Four steel and two wooden hangars supply shelter for 48 aircraft, and there are 50 men available for servicing the machines. There is good lighting, and a custom house and good communication facilities are available. An average of 24 aircraft arrive or depart daily from the airport.

The Austrian Air Transportation Company (Oesterreichische Luftverkehr A. G.) of Vienna operates between Vienna and Venice, 295 miles, in co-operation with an Italian company. Flights are made every other week-day by planes of each company, alternating in daily service, and stops are made at Graz and Klagenfurt. A second service is maintained by the company between Vienna, Prague and Berlin in co-operation with a German and a Czechoslovak company. A service is maintained between Vienna and Konstanz via Salzburg and Innesbruck during the summer months. A service operated during the summer is between Graz and Budapest and this is maintained in co-operation with the Hungarian Air Transport Company. Passengers, mails and goods are carried on all the serv-

ices. One Junkers "G 24," capable of carrying ten passengers and two pilots, and 6 Junkers 4-passenger planes are used. The company's 1928 program calls for a wide extension of its services, while the German Luft Hansa also plans to operate a number of routes in Austria.

Traffic statistics are as follows: during 1927 aircraft of the Austrian Air Transportation Company flew 376,881 kilometers during 1,949 flights and carried 4,274 passengers, 60,835 kilograms of goods and 1,699 kilograms of mail. The numbers of passengers arriving at and departing from the Aspern airport by years are: 1922, 644 passengers; 1923, 2,543; 1924, 4,184; 1925, 6,190; 1926, over 10,000 passengers.

Belgium and the Belgian Congo

Belgium is a member of the International Convention for Air Navigation and has signed treaties regulating civil air transportation with several countries. Commercial aviation is governed in Belgium by a law of November 16, 1919, and royal decrees signed since that time. There is no statutory law in the Belgian Congo but the Minister of Colonies is responsible for regulations of any nature in the colony. Military aviation is under the general control of the Ministry of National Defense, of which there is the aviation branch of the army. There is no naval aviation. Civil aeronautics is under the control of the aeronautics administration, a division of the Ministry of Marine, Post, Telegraph, Telephone and Aviation.

Government appropriations for military and civil aeronautics are given in the following tabulation for 1927:

For military aviation (in Belgian francs)—Salaries, 1,990,000; maintenance of equipment, 6,000,000; purchases of material and equipment, 8,700,000; spare parts and fuel, 6,100,000; aviation schools, 1,700,000; other, 215,000. This is a total of 24,705,000 Belgian francs in 1927 against 26,650,000 Belgian francs in 1926.

For civil aviation (in Belgian francs)—Salaries, 1,961,000; material, 1,902,000; aids for propaganda, experiments, etc., 1,970,000; subsidy for "Sabena" 3,100,000; other 140,422. This is a total of 9,073,422 Belgian francs or 1,100,000 Belgian francs more than 1926.

The "Sabena" subsidy has been fixed at 3,100,000 francs per year since 1924. The government is to pledge 6,300,000 francs per year for 5 years and purchase 2,000,000 francs of additional capital, which is to be raised from 6,000,000 to 10,000,000 francs, in return for more extensive services in the Belgian Congo.

The Société Anonyme Belge d'Exploitation de la Navigation

bolivianos annually for the carriage of mails. Additional sums have been appropriated for the construction of airports. The company maintains regular services between Cochabamba and Santa Cruz, 390 kilometers, and between Cochabamba and Trinidad, 790 kilometers. Several irregular services are operated as the demand requires.

During the first seventeen months' operation ending December, 1927, the company's aircraft made 577 flights, carried 2,663 passengers, 10,114 kilograms of freight and 1909 kilograms of mail. The total distance flown was 132,964 kilometers. The company's operation during the calendar year 1927 covered 263 trips with a total of 60,164 kilometers flown, carrying 1,583 passengers, 1,191 kilograms of mail, 9,414 kilograms of freight and 7,150 kilograms of baggage. The equipment consists of three German planes.

Brazil

Military aviation in Brazil is under the Ministry of War, Aeronautical Section; naval aviation is under the Ministry of Marine, Bureau of Aeronautics; and civil air transportation is under the administration of the Ministry of Transportation and Public Works. General Mariante, Director da Aeronautica Escola de Estado Maior, Rio de Janeiro, is head of military aviation. Centra Almirante Alvaro Muses de Carvalho, Director Beral de Aeronautica, Ministerio da Marinha, is head of naval aviation. The Forca Publica, or state police of the State of São Paulo, have some military aircraft in use. There are two aeronautical publications, "Aviacao" and "Aeronautica" and several aero clubs in Brazil.

About \$400,000 was appropriated for the purchase of aircraft for the army in 1927, and by a law of January 15, 1927, the Ministry of War was authorized to spend \$3,600,000 for aviation over a five year period. About \$360,000 was appropriated for naval aviation during the year 1927. The government has not granted subsidies, but offers similar concessions to all operating companies who seem capable of offering reliable air services.

The French Compagnie Generale d'Entreprises Aéronautiques has a 25 year concession for the operation of an air service 1,250 miles along the Atlantic coast of Brazil. This company, which recently has been granted a subsidy by the French government, has opened offices in Rio de Janeiro, and expects soon to inaugurate its service, which will be an extension of the existing service between Southern France and Dakar on the west African coast. The Brazilian cities to be served are Fernando de Noronha, Natal, Recife, Maceio, Bahia, Caravellas, Victoria, Rio de Janeiro, Santos, Florianopolis, Porto Alegre, Pelotas, and thence the route will go to Monte-

video, Uruguay and Buenos Aires, Argentina. Thirty French aircraft, both seaplanes and land planes, will be used along the South American coast. The service will be once weekly in each direction and will permit the carriage of mails between Paris and Rio de Janeiro in about six days.

A concession for the operation of a service between Fernando de Noronha and Rio Grande, via Bahia, Maceio, Recife, Natal, Caravellas, Porto Alegre and Pelotas, was granted to the Condor Syndicate, an agent of the Deutsche Luft Hansa. This concession was recently turned over to the Empresa Viacao Rio Grandense, a Brazilian corporation, the principal stockholder of which is Bromberg and Cia, a strong German trading company which inaugurated a service between Porto Alegre, Pelotas and Rio Grande several months ago. A German seaplane is used in the service. Two others are in the company's service for occasional flights along the coast. The company is building an airport on an island in the port of Porto Alegre, where machine shop, fuel, houses for pilots, a large hangar and other facilities will be available.

A new company, the Aero Lloyd Nacional, was formed recently in São Paulo for the operation of commercial air services.

The Brazilian government announced that the program for the First National Aviation Congress in Brazil will be held July 14—August 8, 1928, and will include the following: landing fields, air traffic, technical matters, general aeronautics, aid to be given aviation, education in aviation, and general tourist propaganda in connection with aviation.

Bulgaria

There is no military or naval aviation in Bulgaria, they both being prohibited by the treaty of Neuilly. Civil aviation is administered by the Bureau of Aeronautics, which is a division of the Ministry of Railways, Post and Telegraph. The Director of the Bureau of Aeronautics is P. G. Copariffeff.

Appropriations for aviation from April 1, 1925, to April 1, 1926, amounted to \$556,071, and for the year ended April 1, 1927, \$342,000. Of these amounts, \$319,192 and \$128,571, respectively, were specified for the purchase of equipment.

A law effective February 28, 1927, granted a 10,000,000 leva loan to the First Bulgarian Aviation Company. The government was obligated by that law to provide airports with hangars and other services free to the operating company. There are three landing fields, at each of which there is a hangar for two airplanes, gasoline, oil, water and a small shop.

The First Bulgarian Aviation Company, with offices at Sofia, operated over the route, Sofia-Rousse-Varna, 257 miles, from October 25 to December 1, 1927, making two flights in each direction weekly and using three Junkers aircraft, each capable of carrying four passengers and two pilots.

The French Compagnie Internationale de Navigation Aérienne, which has permission from the Bulgarian government to operate across that country, maintained two services per week between Belgrade and Constantinople via Sofia, between October 1 and November 15, 1927. It is expected that this company, which operates between Paris and Constantinople via the several cities of importance enroute, will continue operating via Sofia.

Canada

Canada is a member of the International Convention for Air Navigation, and the Canadian Air Regulations, 1920, with amendments of June 25, 1926, which are in accordance with the convention, regulate civil air transportation in the Dominion. All aviation has been administered by the Minister of National Defense since January, 1923.

The Royal Canadian Air Force, a branch of the Department of National Defense, had complete control over aviation until July 1, 1927, when civil aviation was removed from the Air Force and three offices were established in the ministry under a deputy minister to regulate civil air transportation.

The Canadian Air Force and Reserves continue under the jurisdiction of the old administration. Group Capt. J. F. Scott, Director, Royal Canadian Air Force, Department of National Defense, Ottawa, Canada, is head of the military force.

For the fiscal year ended March 30, 1927, the Dominion government appropriated \$1,800,000 for aeronautics, of which \$994,000 was specified for military aviation. For the year ended March 30, 1928, \$3,892,233 was appropriated, of which \$1,669,694 was for military aviation. The allowance for civil aviation included survey, fire protection, photography and other work for various branches of the government. Recently the government has ordered 36 new airplanes at a cost of \$550,000, to be used for civil air operations.

In September, 1927, the government announced that in order to encourage civil flying, it would assist in the establishment of light airplane flying clubs in the larger cities by issuing to each approved and incorporated club, two light airplanes free of charge. It was stipulated that the club should make provision for housing, repairing and maintaining the aircraft, furnish a suitable field or seaplane sta-

tion, provide for the services of a qualified instructor and a licensed air engineer, and if the demand should grow so that the two machines are insufficient, and the club will buy one light airplane, the government will provide an additional one free. Several clubs throughout Canada have been formed and plans are under way for the distribution of the airplanes and the beginning of training shortly. The government has entered into mail-carrying contracts with private operators, and some attention has been paid to the construction of a mooring mast for airships, which are expected to be put into service between the Dominion and Great Britain.

A brief statistical summary of civil aeronautics in Canada for three years, 1924 to 1926, is as follows:

	1924	1925	1926
Operating companies	8	8	14
Licensed aircraft	32	39	44
Licensed airports	24	34	34
Licensed flyers	201	91	103
Flights made	3,776	3,171	4,755
Hours flown	4,389	4,091	5,860
Passengers carried	5,314	4,897	6,436
Passenger-miles	560,175	446,648	631,715
Freight and express carried (lbs.)	77,385	592,220	724,721
Mail carried (lbs.)	1,221	1,080	3,960

Eight additional operating companies have been reported since the first of January, 1927, and nine additional airports, including a large one at Montreal. The number of licensed aircraft had increased to 60 by September, 1927.

Some details of civil air operation are as follows:

The Canadian Airways, Ltd., of Montreal, operated four sea-planes during 1926, flying 546 hours, carrying 537 passengers, 18,000 pounds of freight and 100 pounds of mail. They mapped 5,000 square miles of land.

The J. C. Elliott Air Service, operated between Hudson, Ontario, and the Red Lake mining district, during the winter of 1926. In this and other flying operations, 587 passengers, 2,000 pounds of freight and 800 pounds of mail were carried.

The Fairchild Aerial Surveys Company, Ltd., used three aircraft in 1926, flying 432 hours, photographed 8,536 square miles and sketched a territory of 14,000 square miles. The company made air maps of the cities of Quebec, Levis and Montreal in 1927.

The Fairchild Air Transport Company, Ltd., operated between Heileybury and Rouyn in 1926 and carried 576 passengers, 24,000 pounds of freight and 4,000 letters.

The Northern Syndicate, Ltd., of Calgary, Alberta, flew 75 hours in exploration work in northern Alberta during 1926.

The Pacific Airways, Ltd., flew 92 hours, carrying passengers and goods, and in exhibition and advertising work during 1926.

The Patricia Airways and Exploration, Ltd., carried 259 passengers, 14,000 pounds of freight and 3,000 pounds of mail in 1926. Recently, the Post Office Department has authorized the company to carry mail from the railway at Sioux Lookout, Ontario, to the Red Lake district. A three passenger Curtiss "Lark" plane is used.

The Western Canada Airways, Ltd., carried 1,000 passengers and 200,000 pounds of express freight between December, 1926, and August 31, 1927. Three aircraft were used. Recently five cabin monoplanes and one light plane were added to the company's equipment, which is operated to the Red Lake mining area. The Western Canada Airways operated without financial loss and without government aid.

Brock and Weymouth of Canada, Ltd., flew 70 hours in 1926, in aerial photography work.

The Compagnie Aérienne France-Canadienne of Montreal, did a great deal of aerial photography in 1926.

Bert McConnell of Windsor, flew 75 hours in exhibition and other flying in 1926.

R. G. Trenholme flew 1,200 miles, carrying passengers in 1926.

The Transcontinental Airways, Ltd., has been given a contract by the Post Office Department for weekly air mail service between Murray Bay on the St. Lawrence river and Seven Islands, and between Moncton, New Brunswick and the Magdalen Islands, Quebec. This service was started recently.

The Eastern Canada Airways, Ltd., was formed in January, 1928, for air transportation and other aeronautic activities.

The Central Canada Air Line, Ltd., is reported to have made an agreement with the Canadian Pacific Railway for the carrying of passengers between Kenora, Ontario, and Red Lake.

The Universal Air Industries, Ltd., of Regina, Saskatchewan, recently got a charter from the government for air services.

The Lethbridge Commercial Airways Ltd., inaugurated a service between High River and Lethbridge, in August, 1927. That distance is 100 miles. Recently, announcement has been made that flights will be arranged between Lethbridge and Waterton Lakes, a famous summer resort, inaccessible except by automobile or airplane.

The British Columbia Airways, Ltd., will establish a Vancouver-Victoria air service, in accordance with recent permission granted by the government.

The Canadian Air Express, Ltd., has just been incorporated to carry on civil air services and other aeronautic operations.

The Yukon Airways and Exploration Company has been granted permission by the Postmaster General to operate an airmail service between White Horse and Dawson, Yukon Territory.

The Canadian Vickers, Ltd., of Montreal, Quebec, will manufacture light airplanes and seaplanes. They expect to complete their first airplane in January, 1928.

The greatest aerial service operations were in the Province of Ontario where eight operators flew 643,568 miles and carried 11,667 passengers and 360,487 pounds of freight.

In October 1927, the Postal authorities operated successfully an airmail service taking mail from steamships far out in the St. Lawrence River, and conveying it to inland points, cutting down the transit time by more than two days; outgoing mail was carried by plane from Montreal to Rimouski, Quebec, a distance of 300 miles, where it was placed aboard ship for Europe. The service between Montreal and Rimouski saves 40 hours in the delivery of mail from Europe to Montreal, the plane bringing the mail to Montreal which further cuts down transit time by carrying it on to Toronto and Winnipeg.

Chile

Military aviation is under the Department of War, and Lieut.-Col. Jose E. Veloso Rivere, is Inspector of Aviation of that department. Naval aviation, headed by Luis A. Davila E. Capitan de Fragata, heads naval aviation of the Department of Marine. There is no branch of the government dealing extensively with civil air transportation.

Decree Law No. 675 was published on November 26, 1925, in order to regulate and control air navigation in Chile. A law of March 29, 1927, provides for the organization of a school of military aviation. In 1926 appropriations for aviation were \$180,000 for the army and \$300,000 for the navy to be used in purchasing and maintaining military aircraft. There are no commercial airports in the country, but the army permits the use of certain of its fields for civil aircraft.

A non-exclusive concession was given to Señor Don Luis Testart in 1925 to operate civil air services between certain points during twelve years. Sr. Testart's organization, known as the *Compania Sudamericana de Aeronavigacion* inaugurated a daily air mail and

passenger service between Santiago and Valparaiso on May 4, 1927. The distance is 73 miles and the schedule calls for a flight from Santiago at 12:50 P. M. and from Valparaiso at 2:00 P. M. One passenger could be provided for in the Moranne Saulnier plane which carried mail for outgoing steamers and incoming mail from abroad. After a few flights this service was temporarily discontinued.

China

There are a number of aircraft in use by military leaders, but there is no naval or civil aviation of importance. The government of the Yunnanfu Province was reported early in 1927 to possess a number of French aircraft and to employ two French pilots as instructors of several selected Chinese student pilots.

The international agreement by which munitions of war, including aircraft, were expected to be prohibited from exportation, still exists, but a number of aircraft have been sent to China.

An important airport is being prepared in the British Colony of Hongkong, off the coast of China, which will be used in the proposed England-to-Australia service, via Singapore, and as a center for routes to China, Japan and the Philippines.

Colombia

Military and civil aviation are under the Ministry of War. There is no naval aviation. Maj. Henry Pillachody of the Swiss Military Mission, is in charge of aviation in the Ministry of War, and he is assisted by Capt. Eduardo Gomez Posada, a member of the general staff of the Colombian Army. The government has maintained a school for the training of air pilots during several years. Aviation is regulated by a decree law of 1920.

Four civil air transportation services, using German planes, are maintained by the Sociedad Colombo Alemana de Transportes Aereos ("Scadta") of Barranquilla and Bogota. The first service along the Magdalena river is from Barranquilla to Girardot, 625 miles via Calamar, Magangue, El Banco, Puerto Wilches, Barranca Bermeja, Puerto Berrio and La Dorada. Regular flights are made Tuesdays, Thursdays and Saturdays in a three-passenger and mail seaplane, eight and one-half hours being required for the trip. Express flights are made Tuesdays and Fridays in a six-passenger seaplane which stops only at El Banco and Puerto Berrio. The second service is maintained by a flight once weekly on Wednesday, between Girardot and Neiva, a four-passenger seaplane being used. The third, or Pacific line, which was inaugurated November 23, 1927, is between Barranquilla and Buenaventura, via Cartagena, Turbo,

Quibdo, and the planes follow the Atrato and San Juan rivers, a three-passenger seaplane being used. The fourth service, known as the Bucaramanga line is maintained by land planes from Puerto Wilches to Bucaramanga via La Gomez. A four-passenger airplane flies daily, except Sundays, and makes connections with the seaplanes on the Magdalena river line. Some of the passenger rates are: Barranquilla to Puerto Berrio, \$150; Barranquilla to Girardot, \$200; Barranquilla to Cartagena, \$25, and Barranquilla to Buenaventura, \$200. Twenty pounds of baggage is carried free, while excess weight is charged for at the rate of \$3 per two and two-tenths pounds.

The Compania Santandereana de Aviacion ("Cosada") also using German planes, operates between Bucaramanga and La Gomez, 80 kilometers daily. The company uses two Junkers "F-13" planes and co-operates with the "Scadta." About 150 passengers are carried per month.

During the year a new aerial transportation company was organized, the Aero-Maritime Company, with a capital of 300,000 pesos. This company plans to establish international coastal air lines between Barranquilla and Colon, and between Barranquilla and Curacao.

Some operating statistics and details of equipment used by the "Scadta" are as follows:

	<i>Miles Flown</i>	<i>Pass. Carried</i>	<i>Pass. Miles</i>	<i>Mail Carried (Lbs.)</i>
1921 (5 months).....	56,664	379	22,850	3,374
1922	128,744	1,137	166,794	10,509
1923	185,451	1,318	257,044	18,015
1924	169,531	1,084	272,216	23,248
1925	183,206	1,134	302,535	26,343
1926	302,025	2,116	652,666	59,674

The equipment comprises twelve German seaplanes and a land plane, of which one is a 10-12 passenger super-seaplane with two 600 H. P. motors.

Cuba

Cuba signed the International Convention for Air Navigation but has not enacted regulatory laws for civil aviation within the country. There is no naval aviation, and military and civil aviation are regulated by the War Department. A large but indeterminate percentage of an appropriation of \$159,500 was made for the army air service during the fiscal year 1926-27.

A daily air mail service between Havana and Key West, Florida,

was inaugurated October 28, 1927. Flights are made in American made Fokker, three-motor craft, capable of carrying 800 pounds of pay load. The operating company, the Pan-American Airways, Inc., has a contract with the United States Post Office Department for the carriage of United States mail to Cuba at the rate of 40½ cents per pound. No extra charge is made for mail addressed to Cuba to be carried by the aircraft. An extra charge of 5 cents per letter is charged on those originating in Cuba and to be carried northward by the aircraft. It is planned to carry passengers and to extend the service as the necessities warrant.

Czechoslovakia

Military aviation is under the Ministry of National Defense. There is no naval aviation. Governmental civil aviation and private commercial aviation are administered by the Ministry of Public Works. General J. Fajfr is Chief of the Aviation Department, Ministry of Defense. The Aviation Section of the Ministry of Public Works is headed by Ing. Zdenko Janak. There are two divisions in the section, the administrative and the technical.

For 1928 the government appropriated 65,865,000 Czechoslovak crowns, or \$1,975,450, for military aviation fields. This is \$137,730 less than for 1927. Of the sum appropriated for 1928, \$874,410 is for the purchase of airplanes without motors and their maintenance, and for the purchase of spare parts for planes. Of the appropriation \$474,930 is for the purchase of new engines and maintenance and for the purchase of spare engine parts. A total of \$744,490 is appropriated for maintenance of flying fields, work shops, laboratories, etc.

There has been a steady increase in appropriations for commercial aviation, beginning with \$671,550 in 1926; \$882,360 in 1927 and \$1,005,120 in 1928.

More important authorized expenditures for commercial aviation in 1928 are stated as follows, in Czechoslovak crowns having a value of 3c each:

Subsidies of air transport, 11,850,000; purchase of new planes, 6,320,000; purchase and grading of new landing fields, 6,450,000; equipment of landing fields, hangars, etc., 1,500,000; aviation propaganda, 1,846,000; operation and maintenance of airplanes 2,419,000.

The three principal airports serve, and are located near the cities of Prague, Brno and Bratislava. Each of these airports has customs offices, good lighting and communication facilities, and other conveniences required for regular air traffic. A new lighting system, in which acetylene lamps will be used, will soon be installed at all three fields. Two towers to aid in night landing will be placed at the

Prague field and one at Brno. The Prague field measures approximately 4,100 by 2,500 feet. There are six iron and concrete hangars. Meteorological information is available here, as at the other two airports. The government lines made 2,268 flights in 1927 with approximately 450,000 kilometers flown. An average of 30 flights a day are made by civil airplanes at the field. The Brno field measures 4,000 feet by 2,700 feet. It has two iron and concrete hangars and it serves 15 aircraft per day. The Bratislava field is 2,000 by 2,200 feet in size and has one brick hangar with a wooden roof. Eight flights per day are made by commercial aircraft.

The Czechoslovak State Air Line (*Ceskoslovenske Statni Aerolinie*) owned and operated by the government under the management of its Ministry of Post and Telegraph, operated between March 16, 1927 and October 31, 1927, between Prague, Brno and Bratislava, 380 miles. The daily service was maintained with four passenger Farman and De Haviland aircraft made in Czechoslovakia by the Aero Company of Prague. In addition to the passengers, these planes carried 500 kilograms of goods. A daily service was maintained between Prague and Marienbad, 75 miles, by the Aero Company of Prague, between July 4 and September 16, 1927. Two "Aero-22" aircraft have been used on this line.

In the Vienna-Prague-Berlin service maintained jointly by three companies, the Czechoslovak State Air Line operated 17 aircraft in 1927, 8 of which are locally built De Haviland DH-50's, capable of carrying 4 passengers, and 7 "Smolik-19's" made in Czechoslovakia, capable of carrying 3 passengers each. The company recently negotiated for the extension of its services to the Netherlands and England. During the month of August, 1927, 413 flights over 73,000 kilometers were made by aircraft of the Czechoslovak State Air Line, which carried 882 passengers and 10,000 kilograms of freight.

The "Avia" airplane factory, which was established in 1919 and reorganized in 1926, produced a number of military and civil aircraft of various types. Roumania ordered six Avia BH-25 planes from the company recently.

The fourth International Aeronautical Exhibition was held at Prague from June 4 to June 16, 1927, and was considered a great success.

Denmark

Denmark recently became a member of the International Convention for Air Navigation and has special conventions with Sweden, Norway, Germany, Netherlands, Great Britain, France and Belgium.

Commercial aviation is governed by law No. 175 of 1923. Commercial aviation activities of the government are carried on by the Ministry of Traffic.

The government pays a subsidy of 250,000 crowns per year, and a deficit of 350,000 crowns accrued up to April 1, 1927, was paid by the government. The Kastrup airport at Copenhagen, measuring 2,750 feet by 2,400 feet, is owned and operated by the government for the benefit of air operating companies. Plans recently announced call for the erection of powerful searchlights and the provision for facilities for the handling of seaplanes.

Swedish, Dutch and German operating companies serve Copenhagen, and there is one Danish operating company, known as the Danish Air Service, Ltd. (Det Danske Luftfartselskar A.G.). The company was formed in 1919, with 900,000 crowns, all Danish capital. It was reorganized in 1926 and fresh capital amounting to 200,000 crowns was taken in. At an earlier date, the capitalization was reduced considerably. The company operated between April 19, 1927, and September 30, 1927, daily between Copenhagen and Malmö, 19 miles, and between Copenhagen and Hamburg, 181 miles. The latter route was covered in one hour and 45 minutes by the four-motored "Jabirus" and six-passenger Fokkers. The "Jabiru" craft carried radio equipment and had accommodations for ten passengers. Some operating results during 1927 by the Danish Air Service Company are:

Kilometers flown, 188,081; passengers carried (regular services), 1,630; passengers carried (pleasure), 2,120; goods and baggage carried (Kg) 38,167; mail carried (Kg) 5,979.

During the first 9 months of 1927, 8,782 passengers arrived at or departed from Copenhagen in 2,860 arriving and departing aircraft.

Statistics compiled by the Danish Commercial Air Service covering the past three years gives the number of kilometers flown in 1927 as 188,081 as against 204,417 in 1925 and 203,954 kilometers in 1926. This reduction is due to the fact that the service to Hamburg was the only route maintained during 1927, whereas in the two preceding years the air service also reached Cologne. The regular route service as well as pleasure flights showed a considerable increase in the number of passengers, viz., 1,630 passengers for the regular route service and 2,120 for pleasure flights, as against 1,032 and 954 passengers respectively in 1926. The transportation of freight and luggage increased 42.4 per cent to 38,167 kilograms, and transportation of mail increased 444.9 per cent or to 5,979 kilograms. The results attained with regard to regularity of service shows that the Danish

Company is on par with companies abroad, only two accidents having occurred during the season.

There is one aircraft factory in Denmark, owned and controlled by Germans. It is the Rohrbach. A few aircraft are built by army and navy shops. An aviation exhibition held in Copenhagen from August 20 to September 2, 1927, under the auspices of the Royal Danish Aviation Society, was visited by 85,000 paying visitors.

Dominican Republic

The West Indian Aerial Express, incorporated in the Dominican Republic and with offices at Santo Domingo, established two services on December 1, 1927. The first is between Santo Domingo and San Juan, Porto Rico, a distance of 250 miles, over which three flights are made each week. The second is between Santo Domingo and Port au Prince, Haiti, 180 miles, where a weekly service is operated. Four American aircraft are employed, a 10 passenger Keystone Pathfinder equipped with Wright Whirlwind engines; a four passenger, single-engined Fairchild cabin plane and two, three-passenger Wacos, with OX-5 motors. Four pilots, one mechanic, one assistant mechanic and six chauffeurs are employed. During 1927, 60 pounds of mail, 50 pounds of goods and 283 passengers were carried on the scheduled flights, covering 10,313 miles. An additional 10,000 miles were flown without schedule. The passenger rate from San Juan to Santo Domingo is \$50, from Santo Domingo to Port au Prince, \$40, from San Juan to Port au Prince, \$85. Goods between San Juan and Santo Domingo go at the rate of 25 cents per pound, and from San Juan to Port au Prince, 42½ cents per pound.

The company, under its contract with the government of the Dominican Republic receives \$2.50 per pound for mail carried with a minimum of \$500 per month, plus \$1,500 per month and the privilege of purchasing fuel and oil at cost from the government. The equipment is entered into the country free of duty.

Egypt

Late in 1927, an aviation section was established in the Ministry of Communications of the Egyptian government. The following appropriations were approved by the Superior Council on November 7, 1927: \$20,000 for grading and other work on the proposed Cairo airport at Almaza; approximately \$490,000 for the construction of the airport at Cairo; \$15,000 for the construction of an airport at Alexandria, and \$53,500 for equipment at the Cairo airport. An airport of considerable importance for seaplanes at Alexandria, is planned.

Regular passenger, mail and express service is maintained by the British Imperial Airways, between Cairo and Bagdad. In addition, there is a military service operating between Cairo, Ramleh, Palestine, Aman, Transjordan and Bagdad. The planes on this line are used to carry mails, but no passengers, or goods for commercial houses are carried.

Estonia

Military aviation is a separate branch of the army administered by the Ministry of War. Civil aviation is regulated by the Ministry of Communications. The government maintains an airport at Tallinn on which it is expected shortly to spend the sum of \$32,170. The Estonian "Aeronaut" Company began operation again in February, 1927 between Tallinn and Helsingfors, Finland, 54 miles. The subsidies of the government proved insufficient to meet the required expenses and the company asked for \$13,400 on June 1, 1927. This assistance was not given, but the government decided to request legislation for an appropriation of about \$32,170 for the company, of which \$20,100 was to be spent for new aircraft. Negotiations have been started by the government with a view to purchasing the company's planes and operating the services. The company employed three German Junkers F-13, two Sablatnig P3's and one LVG aircraft.

The Finnish Air Transport Company started its services between Helsingfors and Tallinn again in January, 1928. There are two airports at Tallinn, one for land planes and the second for seaplanes. Both have been controlled by the Aeronaut company, but the landing field is owned by the army.

Finland

Civil aviation is regulated in accordance with general laws of 1918 and 1923. A department for civil aviation will soon be formed in the government. The laws fix the liabilities of aircraft operators, and prohibit unlicensed flyers from operating aircraft. Military and naval aviation together comprise the Finnish air force, which is subordinate to the Ministry of Defense and to the Chief of the Army. Commercial aviation is regulated by the Ministry of Communications, but the Ministry of Defense has supreme authority. K. R. Salorius will head the new department. Lieut.-Col. Wuori is chief of the air force, and Col. K. Solin has charge of technical matters and the purchase of aircraft for the Ministry of Defense.

For 1926, the government granted 38,000,000 Finnish marks for the maintenance of the air forces. A loan of 2,500,000 Finnish

marks was granted by the government for the purchase of a German airplane and accessories by the Finnish Air Transport Company. Additional loans are expected. The Post Office Department has an agreement with the company for the carriage of mails. For 1927, 30,000,000 Finnish marks were appropriated for the air forces, of which 6,850,000 marks were fixed as the expense for the upkeep of existing, and the purchase of new aircraft and equipment. The latter sum will be increased to 11,000,000 for 1928. In the extraordinary budget for 1927, an allowance of 26,000,000 Finnish marks was made for the development of aviation in Finland. This will be reduced to 16,000,000 for 1928. The government offers what assistance is possible, generally, for the development of air transportation. Subsidies amounted to 350,000 marks in 1926, a little more in 1927 and about 500,000 for 1928.

The one air transport company in Finland has a capital of 1,400,000 Finnish marks, a large part of which is owned by the Junkers Company of Germany. The company's service between Helsingfors and Tallinn, Estonia, was started August 10, 1927, after having been inactive during the preceding winter. While the Estonian company did not operate through the summer of 1927, the Finnish plane continued until October 1, 1927. Four passenger Junker F-13's with single motor are used. The fare per passenger is equivalent to \$21.20. The second service of the company is that between Helsingfors and Stockholm, Sweden, 259 miles, over which route a Swedish company also operates. The Finnish plane flew from June 1, to October 1, 1927, a ten-passenger G-24 W plane being used. A third service was inaugurated August 10, 1927, between Helsingfors and Riga, about 200 miles. The service was maintained with Junkers planes until October 1, 1927, and the passenger fare was \$25.50. A service was maintained on the Helsingfors-Stockholm Line between Stockholm and Abo, Finland, between October and November 15, 1927, during which time the airplane flew 9,450 kilometers and carried 47 passengers and 1,022 kilograms of goods. Connections are made at Stockholm with other air services between that city and points in Western Europe. The German Luft Hansa connects with the Finnish service at Riga, which makes it possible for passengers, mails and goods to make an almost uninterrupted journey from Helsingfors to cities in Germany and adjoining countries.

Passengers arriving at or departing from Helsingfors, in the Helsingfors-Stockholm service during the quarter ended September 30, 1927, numbered 907 compared with 600 in the same period of 1926. Mails amounted to 3,039 kilograms compared with 1,528;

newspapers 1,683 compared with 120 kilograms; goods, 756 kilograms compared with 748 kilograms. In the Helsingfors-Tallinn service, for the same period, the passengers were 918 and 966; kilograms of baggage, 8,126 and 9,061; mails, kilograms, 132 and 104; goods, 222 and 118.

There are no aircraft factories or assembling plants in Finland with the exception of the state airplane factory at Sveaborg, which builds airplanes, but does not manufacture motors.

France

France is a member of the International Convention for Air Navigation and has treaties with the principal countries of Europe regulating air transportation between France and those countries. By a law of July 31, 1920, the French government was authorized to enter into a 10-year contract with private companies and to give them subsidies for regular services. The rule of renewing contracts annually has been followed more often than not. By the "General Contract Provisions and Specifications in Contracts Decree" of December 27, 1924, all the airplanes of operating companies must be of French manufacture.

Four ministries of the French government are directly concerned with aeronautics. The Ministry of Commerce and Industry regulates civil air transportation through its General Direction of Aeronautics and Air Transportation (*Direction Generale de L'Aeronautique et des Transports Aériens*). The Ministry of War has a Bureau known as the "*Direction de l'Aéronautique Militaire*" and the Ministry of Marine has the "*Service Central de l'Aéronautique Maritime*." The Ministry of Colonies is concerned with all civil aviation in the colonies. The *Direction de l'Exploration Postale* of the Ministry of Commerce is concerned with questions of the use of air services in France and abroad for the quick carriage of mail and related matters.

The budget for the year 1928 allows 618,000,000 francs for military aviation, 209,475,000 francs for naval aviation, and 218,174,140 francs for civil aviation. The allowance for naval aviation is more than twice that allowed in 1927. The increase in the civil aviation budget amounts to almost 49,000,000 francs.

The largest items in the budget for civil aviation is that of 115,000,000 francs for "premiums and subsidies." This sum is 45 per cent greater than that of 78,650,000 francs authorized for 1927. The principal single increase is one for 38,000,000 francs to the *Compagnie Generale Aéropostale* for the extension of its lines from Dakar to Buenos Aires. The subsidies by services are as follows:

Toulouse-Marseilles-Casablanca-Dakar, 22,550,000 francs; Dakar-Buenos Aires, 38,000,000 francs; Marseilles-Algiers, 3,400,000 francs; London-Paris, 8,500,000 francs; Paris-Marseilles, 4,500,000 francs; Marseilles-Tunis, 3,700,000 francs; Marseilles-Athens-Syria, 2,500,000 francs; Paris-Prague-Constantinople, 600,000 francs; Prague-Warsaw, 22,850,000 francs; Constantinople-Aleppo-Bagdad, 600,000 francs; Paris-Amsterdam, 3,100,000 francs; Paris-Berlin, 4,700,000 francs; total 115,000,000 francs.

There are about 30 civil airports in France and many of the military airports are available for use.

Although there was no overnight commercial flying in France in 1927, there were put into operation 27 aviation beacons extending from the English Channel and Belgian border to the Mediterranean Sea. These beacons include three types: "Aerdrome Beacons," serving to direct fliers to landing fields; "Flashing Beacons" near large cities with a system of periodic flashes by which pilots may identify them; "Long Distance Beacons," of which there are but two, having a radius of approximately 100 miles in fair weather. One of these is located at Mt. Valerian near Paris and the other near Dijon.

The airport at Paris, known as Le Bourget, is one of the largest and best equipped in the world. It measures approximately 3,100 by 52,000 feet. It has an excellent surface, good lighting facilities, and good communication services. There are 17 large hangars, a branch custom house, ticket offices, a restaurant, and other buildings. A special building houses a well-arranged weather map and meteorological data display boards. Some 400 persons are employed by private operating companies to do their repair and other work.

Air shipments at Le Bourget aviation field have increased 1,100 per cent in six years; detailed figures are as follows: 1921, exports 16,070,000 francs, imports 7,945,000 francs; 1922, exports 29,646,000 francs, imports 12,262,000 francs; 1923, exports 60,848,000 francs, imports 16,843,000 francs; 1924, exports 89,090,000 francs, imports 37,238,000 francs; 1925, exports 125,736,000 francs, imports, 64,555,000 francs; 1926, exports 189,893,000 francs, imports 100,694,000 francs.

The Compagnie Generale Aéropostale (formerly Compagnie Generale d'Entreprises Aéronautiques) operates between Toulouse and Casablanca via Perpignan, Alicante, Malaga, Tangiers, and Rabat, 1,146 miles. Seven round trips are made each week between Marseilles and Perpignan, 170 miles. Between Casablanca and Dakar via several cities on the northwest coast of Africa, 1,770

miles, one round trip is made each week. The company plans immediately to extend this service from Dakar to Buenos Aires, Argentina, and several flights have been made recently between Buenos Aires and Rio de Janeiro. The sections of the extended service are: Dakar to Cape Verde Islands, 487 miles by seaplane; from Cape Verde Islands to the Island of Noronha, 1,366 miles by fast boat, making the crossing in three days; from Noronha to Pernambuco 404 miles by seaplane; from Pernambuco to Rio de Janeiro, 1,211 miles by airplane; from Rio de Janeiro to Buenos Aires by airplane, 1,504 miles. The total length of the new service will be 4,972 miles, of which 1,366 will be covered by fast surface vessels. Together with the services already in operation this route between Toulouse and Buenos Aires will be the longest air line in the world, 7,888 miles. The company employs 108 aircraft and 329 airplane motors. Most of the airplanes are Breguet single motor two-seater biplanes. A total of 399 employees, including 55 pilots, are employed.

The Compagnie Air Union Aéronavale operates between Paris and London, 233 miles, six to twelve round trips per week; between Paris and Marseilles via Lyons, 460 miles, five round trips per week; and between Antibes (near Marseilles) and Tunis via Ajaccio, 530 miles, two round trips per week. The company employs 38 aircraft and 153 airplane motors. There are 19 pilots among its total of 335 employees. The Compagnie Internationale de Navigation Aérienne operates between Paris, Prague, and Constantinople via Strasbourg, Vienna, Budapest, Belgrade and Sofia, 1,712 miles, three round trips per week between November 1 and March 31 and six round trips each week during the remaining part of the year. Between Prague and Warsaw, 329 miles, the same schedule is maintained. This company employs 65 aircraft, 170 airplane motors and 534 employees, including 35 pilots.

The Société Generale de Transport Aérien (Lignes Farman) operates between Paris and Amsterdam via Brussels, 286 miles, three to six round trips per week, and between Paris and Berlin via Cologne and Essen, 570 miles, three round trips per week (the German Luft Hansa maintains three round trips per week over the same route, the planes of the two companies alternating). The company employs 20 aircraft, 51 airplane engines and 75 employees, including 7 pilots. The Compagnie Aérienne France operates between Marseilles and Algiers, 450 miles, two to three round trips per week. Six seaplanes of the "Meteore" and "Lat. 21" (Latecoëre) types are employed.

The Air Union Lignes d'Orient has received a subsidy allowance for a service between Marseilles, Athens and Syria, and it is expected

to make one round trip per week during the year 1928 over this route. The Compagnie Internationale de Navigation Aérienne has also been allowed a subsidy for operating between Constantinople, Aleppo and Bagdad, and this company is expected to make twenty round trips per year over this route.

Some operating statistics are given in the following tables:

Traffic of French Air Services

Company	Kilometers Flown		Passengers Carried		Goods Carried		Mail Carried	
	1926	1927 (1st 6 mos.)	1926	1927 (1st 6 mos.)	1926	1927 (1st 6 mos.)	1926	1927 (1st 6 mos.)
						Kgs.		Kgs.
1. Compagnie Generale d'Entreprises Aeronautiques.....	2,469,329	1,201,642	4,586	2,013	59,463	31,413	576,934	201,306
2. Compagnie Internationale de Navigation Aérienne...	1,451,930	792,335	3,247	1,514	380,951	291,095	12,418	4,464
3. Air Union.....	894,037	498,098	8,047	2,772	501,353	161,461	4,064	1,638
4. Societe Generale de Transport Aerien,	392,061	215,069	2,981	1,500	126,122	59,214	1,497	858
5. France-Algerie.....	13,228	16,217	.....	.....	.....	.....	10	.....
TOTAL.....	5,220,585	2,732,361	18,861	7,799	1,067,889	543,183	594,923	208,266

The number of passengers and kilograms of goods and mail carried are the totals transported over each leg or stage of each route.

A statement of personnel and equipment employed in French commercial air lines as of November 1, 1927, follows:

Personnel and Equipment	Compagnie Generale d'Entreprises Aeronautiques	Compagnie Internationale de Navigation Aérienne	Air Union	Societe Generale de Transport Aerien
PERSONNEL				
Pilots	55	35	19	7
Workmen	253	356	209	41
Managing personnel	45	12	15	16
Other employees	46	151	92	11
Total	399	554	335	75
EQUIPMENT				
In service				
Plane bodies	108	65	38	20
Motors	329	170	158	51

In 1926, the French commercial air lines carried 1,175,900 "ton-kilometers" (each passenger counted 100 kgs.) and had a total available carrying space of 2,524,250 ton kilometers, making their "commercial return" approximately 46 per cent. In 1925, these lines carried 1,201,948 "ton-kilometers" of a total available space of 2,335,526 ton-kilometers, resulting in a commercial return of 51 per cent. A comparison of the first six months of 1927 with the first half of 1926 shows only a slight upward movement of traffic with 558,175

ton-kilometers carried in the first half of 1927 as compared with 546,835 ton-kilometers for the same period in 1926.

In 1926 the Air Union, operating the Paris-London line, had the highest "commercial return"—61 per cent. In the first six months of 1927 the Compagnie Internationale de Navigation Aérienne, operating the Paris-Constantinople line, had a commercial return of 60 per cent, while the Air Union carried only 46 per cent of its total capacity. In the one and a half year period under review, the Compagnie Generale d'Entreprises Aéronautiques (now Compagnie Generale Aéropostale) operating the Toulouse-Dakar line, had the greatest total volume of traffic of all the lines, although it was lowest in its ratio of "ton-kilometers" carried to "ton-kilometers" available, amounting to only 37 per cent in 1926 and 34 per cent for the first half of 1927.

The following table shows a detailed cross section of operating statistics of all lines for 1926 and first half of 1927.

	YEAR 1926			
	<i>Compagnie Generale d'Entreprises Aeronautiques</i>	<i>Compagnie Internationale de Navigation Aerienne</i>	<i>Compagnie Air Union</i>	<i>Societe Generale de Transport Aerien</i>
Kilometer-tons, available..	981,000	472,000	775,250	296,000
Kilometer-tons, carried ...	366,100	255,000	435,500	119,300
Commercial returns	37%	54%	61%	40%
Subsidies per kilometer- tons carried	Frs. 33.91	Frs. 71.98	Frs. 23.53	Frs. 36.04
Miscellaneous returns per kilometer-ton carried ...	31.58	26.56	22.05	11.90
Cost price per kilometer- ton carried ¹	95.55	98.54	43.87	57.63
Cost price per milometer- ton offered	35.66	53.24	26.90	23.25
	FIRST SIX MONTHS 1927			
Kilometer-tons, available..	487,000	272,100	340,200	157,800
Kilometer-tons, carried ..	169,298	164,082	157,056	67,739
Commercial returns	34%	60%	46%	43%

French airplane manufacturers have established aviation schools, giving in most cases a first and second degree diploma upon completion of the courses. The following is a resumé of the prices charged at the various schools for the courses:

Morane-Saulnier—Certificate of flying, first degree, 10,900 francs; second degree (supplemental, taken upon completion of first), 13,600 francs; complete military certificate, 38,000 francs.

¹The cost price has been calculated by taking the debit in exploitation accounts. That of the Air Union having not yet been approved, figures concerning this company are subject to changes.

Farman—9,000 francs (1st degree), for instructions terminating in 17 hours of flying. If the student cannot finish the course in 17 hours of flying, he is required to pay an additional charge for the hours above 17. If the student cannot attend classes regularly, arrangements can be made for special lessons, costing from 420 to 680 francs per hour, depending upon the type of plane used and whether solo or double flying is desired.

France-Aviation—First certificate, 16,000 francs; 2nd certificate, 20,000 francs. For commercial flying, including night-flying, 37,000 francs.

Bleriot—1st degree, 10,000 francs; 2nd degree, 8,000 francs.

Before receiving their diploma, all candidates for the first degree must have had a minimum of 15 hours of flying, during at least six weeks of instructions. Candidates for the second degree must have had at least 26 hours of solo flying during a minimum of three months of preparation. In addition, they must pass a test on signals, and national and international air regulations. The certificate for the first degree is valid for 12 months and that for the second degree, six months. Both can be renewed for a similar period providing the pilot has had at least three hours of flying during the preceding semester.

Germany

Germany is not a signatory to the International Convention for Air Navigation but treaties have been made with neighboring nations for the regulation of international air traffic. Those with France, Belgium, Czechoslovakia, Italy, Spain and Great Britain are especially important. Air navigation is regulated by laws enforced by the Department of Transportation and Communication, the Air Department of which controls civil aviation. There is no military or naval aviation.

Airports are controlled largely by the municipalities owning and operating them, and airways are largely under control of the states.

With a view to concentrating the flight safeguarding service throughout the country an office in the Department of Transportation and Communication, known as the "Central Bureau for Flight Protection," was formed in July, 1927. Wireless stations at all airports are controlled by this office.

The national, state and municipal governments are generous in their aids to air transportation. It is estimated that they spend nearly 80,000,000 marks annually in the furtherance of aeronautics and that about half the total is paid by the national government.

The following appropriations of the government have been reported:

	1925-26	1926-27	1927-28
	Marks	Marks	Marks
Airport wireless stations.....	160,000	485,000	950,000
Exhibitions and competitions.....	3,582,000	2,000,000	2,000,000
Meteorological services	142,000	1,290,000	1,800,000
Scientific development	4,870,000	16,000,000	8,700,000
Adlershof Experimental Station.....	850,000	1,950,000	2,700,000
Air transport subsidies.....	6,700,000	15,571,000	19,750,000
Appliances for safety, maps and plans...	4,000,000	4,350,000	3,000,000
Glider and light plane development, training of personnel.....	3,600,000	5,100,000	4,700,000
Aid to Aerodynamics Experimental Station at Göttingen.....	250,000	100,000	200,000
Aid to aircraft museum.....	3,500	3,500	3,500
	24,157,500	46,849,500	43,803,500

(German gold mark equals 23.8 cents.)

Prussia voted 2,500,000 marks for aviation in 1926, of which 1,500,000 marks were for the purchase of shares of Luft Hansa stock. Bavaria voted 900,000 marks, of which 300,000 marks were for improving airports. Saxony spent 500,000 marks; of this 90,000 marks were for contributions to two local air transport companies and 250,000 marks were to subsidize services over the state's territory.

The Deutsche Luft Hansa A. G., of Berlin, which maintains all German services and has a capitalization of 25,000,000 marks, is owned 55 per cent by private capital, 26 per cent by Prussia and 19 per cent by states. In 1927 it maintained some 75 services extending nearly 15,000 miles. Some of these were operated jointly with foreign companies, but the total number of German services and length of lines was greater than for 1926. Some of the new routes were Konstanz to Vienna via Innsbruck and Salzburg, started in August, and Berlin-Dresden-Prague-Vienna operated in co-operation with a Czechoslovak and an Austrian company.

The company uses some 150 aircraft, each seating four or more passengers. Some types are Junkers "GXXIV," Junkers "FXXIII," "Dornier Merkur," and "Fokker FVIIa."

The Luft Hansa started operations the first part of April, 1926, with 30 lines, to which 24 other lines were added in the next few months.

The number of miles flown on regular traffic schedule during nine months of 1926 amounted to 3,816,131 miles, as against 3,075,571 miles for the entire year of 1925. This increase of 24 per cent is

the more remarkable because air traffic in 1926 ceased altogether during the first quarter of the year.

The transportation of passengers increased 53.3 per cent; freight and parcel transportation increased about 115 per cent; mail transportation, about 86.4 per cent, as follows:*

	No. of Cabin Planes	Planes Open	No. of Flights	Miles Flown	No. of Passen- gers	Freight in Lbs.†	Mail in Lbs.†
1919 .....	...	...	.....	360,481	2,042	.....	.....
1920	27	115	.....	298,291	3,975	12,569	14,122
1921	34	124	.....	1,027,746	6,804	6,355	.....
1922	50	75	2,504	747,931	7,733	81,585	70,560
1923	72	73	3,064	446,045	8,507	85,995	11,025
1924	107	142	4,198	983,934	13,422	156,555	48,510
1925	142	182	18,634	3,075,571	55,185	1,148,805	632,835
1926	200	...	.....	3,816,131	56,267	1,416,817	665,668

The mileage flown shows an increase of 741,560 miles over the figure for the whole of 1925, but comparison is difficult owing to the fact that, whereas in 1926 both passengers and goods were counted according to the number of stages covered, complete journeys only were taken into consideration in arriving at the figures for 1926.

The statistics of the German Luft Hansa for the first six months of 1927 show 275,968 kilograms of freight traffic, and that 39,643 passengers were carried, double the number over the same period of 1926. An increase in freight traffic was specially marked over the line from Berlin to Paris and London to Amsterdam, on which routes it was necessary to add additional equipment to meet this increased traffic. The principal commodities carried were cut flowers, choice fruits, moving picture film, latest fashions, textiles, sporting, art and leather goods, automobile motors, jewelry, laces, etc. There were also heavy shipments of bank securities and documents.

The air mail services are increasingly popular in Germany. General mail and letters of all kinds, small packages and newspapers are carried in the domestic air service. Packages must not measure more than 50 by 50 by 100 centimeters (about 20 by 20 by 40 inches). The German operating company advertises its services widely with a view to attracting freight traffic as well as passengers and mail. The air freight rates are two to three times as high as the railroad express freight rates. For example, the railroad express freight rate (minimum charge) for five kilograms is one mark from Breslau to Berlin, 373 kilometers, compared with 2.25 marks by airplane. The same

*In 1926, statistics compiled for completed journeys, instead of stages and operations, are for 9 months instead of 12.

†These figures probably include newspapers which are carried to rural districts by plane in some cases.

size package requires a minimum charge by railroad express freight of 1.40 marks from Koenigsberg to Berlin, 699 milometers, compared with 5 marks by airplane. From Cologne, 577 kilometers, the rates are 1.30 marks and 3.75 marks; from Stuttgart 650 kilometers, they are 1.40 marks and 4 marks respectively. Shippers are making appeals to the Luft Hansa with a view to getting reduced rates for goods carried by airplanes.

In 1927 the Luft Hansa made an arrangement with the German Railway Company, whereby each will accept shipments from the other and deliver them to the consignees or accept shipments from shippers and deliver to the air operating company or the railroad as the case may be. A bill of lading for use jointly by the two means of transportation is available for shippers in all parts of Germany.

The Luft Hansa also has agreements with other air transportation companies so that passengers, mails and goods are transferred from one air service to another at junction points. This co-operation between air transportation companies has been one of the outstanding improvements during the last two years. Passengers may inquire at any office and learn the cost of a passage to any other city served by an air transportation company and book passage through to destination.

The operations of the Luft Hansa are not as extensive in the winter as in the summer. During the height of its traffic in 1927 it had in operation 66 lines and in addition 9 lines which it operated jointly with companies of other European nations. These joint international lines, length of routes and passenger fares charged are as follows:

Internationally Operated Routes

<i>Route</i>	<i>Passenger Fare</i>	<i>Distance Miles</i>
Berlin-Essen-Hühlheim-Cologne-Paris	\$ 42.88	315
Operated in conjunction with the French Company, La Société Generale d'Entreprises Aéronautiques, Farman.		
Berlin-Danzig-Königsberg-Kowno-Smolensk-Moscow	71.46	1,145
Operated in conjunction with the Russian Company, Deruluft.		
Berlin-Halle-Leipzig (Schkeuditz)-Erfurt-Stuttgart-Zurich-Lausanne-Geneva-Marseilles-Barcelona-Madrid .	91.70	1,310
Operated in conjunction with the Swiss Company, Ad Astra Aero A. G., and the Basel Air Transportation Company.		
Geneva-Basel-Mannheim-Frankfort a.M.-Cologne-Düesseldorf-Essen-Hühlheim-Amsterdam	19.30	544
Operated in conjunction with the Swiss Company, Basel Air Transportation Company.		

<i>Route</i>	<i>Passenger Fare</i>	<i>Distance Miles</i>
Malmo-Copenhagen-Lubeck-Travemunde-Berlin-Dresden-Prague-Vienna	\$ 41.92	554
Operated in conjunction with the Czechoslovakian Company, the Air Transportation Company, and the Austrian Company, Austrian Air Transportation Company.		
Copenhagen-Hamburg-Dortmund-Cologne	29.30	397
Operated in conjunction with the Danish Air Transportation Company.		
Madrid-Barcelona-Marseilles-Geneva-Lausanne-Zurich-Munich-Vienna-Budapest	138.16	1,377
Operated in conjunction with the Swiss Company, Ad Astra Aero, and the Basel Transportation Co., also the Spanish Air Transportation Company.		
Hamburg-Bremen-Amsterdam	19.06	242
Operated in conjunction with the Dutch Company K. L. M. (Royal Air Transportation Company).		
Riga-Reval-Helsingfors		
Operated in conjunction with the Swedish Company, the Aerotransport Company and the Estonian Company, The Aeronaut Company.		

Freight is carried on the above routes at an average rate of $\frac{2}{3}$ per cent of the passenger rate per pound. All service is daily except Sunday.

The Luft Hansa has furnished the following statement of commercial air activities in Germany during 1927:

"There were in Germany at the end of 1927, 86 airports for land planes and 9 which, in addition, are adapted especially for sea-planes. The distances flown by German airplanes in the passenger, freight and combined services in 1927 was 5,721,593 miles. On these flights 102,681 passengers (against 56,268 in 1926) were transported and 641,186 kilograms of freight (258,464 in 1926), 821,921 kilograms luggage (385,945 in 1926) and 449,816 kilograms mail (301,945 in 1926) were carried. These figures, large in themselves, show an increase of 82% in passenger transportation, of 148% in freight, 113% in luggage, 58% in mail, and of 50% in mileage for 1927 over 1926. There are 12 airport radio stations from which weather reports, directions to air pilots in flight and other information is sent out. Four additional radio stations for the air service are under construction."

Great Britain

Great Britain is a member of the International Convention for Air Navigation and has signed special treaties regulating international

air transportation with several European countries, including Denmark, the Netherlands, Norway, Sweden, Switzerland and Germany. The arrangements with Germany were completed in 1927. All aeronautics are under the Secretary of State for Air, who heads the Air Ministry. Very large appropriations are made for military aviation including large sums for research work and the purchase of equipment. Civil aviation is under the direction of the Director of Civil Aviation, who heads the Department of Civil Aviation of the Air Ministry.

Included in the officers of the Air Ministry are:

Lt. Col. the Rt. Hon. Sir Samuel J. G. Hoare, Bart., C. M. G., M. P. Secretary of State for Air.

Sir Philip A. G. D. Sassoon, Bart., C. B. E., C. M. G., M. P. Under Secretary of State for Air.

Sir Walter F. Nicholson, K. C. B. Secretary of the Air Ministry.

Sir W. Sefton Brancker, Air Vice Marshal, etc. Director of Civil Aviation.

F. G. L. Bertram, Esq., C. B. E. Deputy Director of Civil Aviation.

Lieut. Col. I. A. E. Edwards, C. M. G., Chief Technical Adviser, Directorate of Civil Aviation.

In addition to many aids, the cost of which cannot readily be computed, the government will have spent £3,425,686 during the seven years ending March 1, 1928. Of this sum £1,382,780 were spent for certain direct aids to operating companies during the period. A direct subsidy of £137,000 is payable by the government to the only operating company (The Imperial Airways, Ltd.) for its services between Great Britain and the continent for each year until 1928, after which the annual amounts will taper downward to the final payment of £32,000 in 1934. The total subsidy payable under the existing agreement made in 1926 is repayable by the company when it has reached a profit-earning financial condition. The same company under another contract received not to exceed £93,600 additional per annum for its service between Egypt and India. This supplemental agreement, effective January 1, 1927, is to last five years. Payments during the second year are to be £900 per flight over each section of the route between Cairo and Karachi, the dividing point being at Basra. Actually, the service has been operated only as far as Basra.

London's airport, Croydon, has been rebuilt at a cost of nearly a million dollars. Experiments are being made for the improvement of lighting facilities there and at other airports as well as along the airway between Croydon and the channel coast. Weather reports are published several times daily, radio direction finding stations are operated during the daylight hours, and experiments are being car-

ried on with a view to improving engines and other equipment for the use of the operating company.

Detailed statistics of recent appropriations are:

	1927	1926
Pay, etc., of the Air Force.....	£4,261,000	£4,667,000
Quartering, Stores (except technical) Supplies and Transport.....	1,945,000	2,268,000
Technical and Warlike Stores (including Experimental and Research Services).....	8,489,000	8,231,000
Works, Buildings and Lands.....	2,377,000	2,843,000
Medical Services.....	315,000	347,500
Educational Services.....	529,000	448,000
Auxiliary and Reserve Forces.....	500,400	406,500
Civil Aviation.....	474,000	473,000
Meteorological and Miscellaneous Effective Services.....	179,000	172,000
Air Ministry.....	710,000	762,000
Total.....	19,779,400	20,618,000

NON-EFFECTIVE SERVICES

Half Pay, Pensions and other Non-Effective Services.....	207,000	246,500
Total	19,986,400	20,864,500

These figures are from "Air Estimates, 1927." There are certain deductions made from these estimated expenditures for each of the years ended March 31.

The estimates for civil aviation are divided as follows:

	1927	1926
Civil Aviation Aerodromes.....	£28,000	£30,500
Air Routes, Surveys, etc.....	31,000	30,000
Technical Equipment.....	16,000	14,000
Works, Buildings and Lands.....	150,000	216,000
Miscellaneous	2,000	2,000
Civil Aviation Subsidies.....	247,000	180,000
Gross Total.....	474,000	473,000
Appropriations in Aid.....	10,000	11,000
Net.....	464,000	462,000

Airplane clubs in England upon meeting certain requirements, obtain a grant of £2,000 each upon organization, and £1,000 per year for maintenance. In addition, a sum of £10 is paid by the Air Ministry to the club for each member who obtains a Class A pilot's license. The budget for the fiscal year appropriated £16,400 for "assistance

to light airplane clubs." There are six officially aided light air clubs in England with a total membership of 1,058. A total of 97 members have pilot licenses, of whom 55 qualified on club aircraft. These clubs had a record of 10,652 flights last year, with a total of 4,358 hours flying.

The Imperial Airways, Ltd. maintains services over routes extending 2,500 miles. A daily service is operated throughout the year between London and Paris, 225 miles, and during the summer season as many as three flights are made in each direction each day. A daily service is maintained beyond Paris to Zurich via Basel, 310 miles. A daily service is maintained between London and Brussels via Ostend, 199 miles, in co-operation with the Belgian operating company, "Sabena." Several flights are made daily during the busiest part of the year. Between London and Cologne via Brussels, 320 miles, the British company operates daily; and between Southampton and Guernsey, 118 miles, a weekly service is maintained with a seaplane during April and May, and a semi-weekly service during June, July and August. The company employs three Armstrong 3-engined, 20 passenger; 1 Handley Page 3-engined, 14 passenger; 3 Handley Page 2-engined, 14 passenger; 2 Handley Page 2-engined 12 passenger; 1 Handley Page 3-engined, 9 passenger; 1 Vickers "Vulcan" 6 passenger; and 2 De Havilland, 4 passenger craft, as well as a 2-engined seaplane. A weekly service between Cairo and Basra via Gaza, Rutbah and Bagdad, 1,118 miles, is maintained with 5 De Havilland 3-engined, 14 passenger planes. Mail, passengers and goods are carried on all services and arrangements are made for quick transfers between these services and other air services as well as other transportation lines.

In 1926 there were 4,777 flights compared with 4,424 in 1925 covering 840,000 and 862,000 miles respectively. The numbers of passengers carried were 20,367 in 1926 and 14,068 in 1925; cargo carried (including excess baggage and mail) 679 tons in 1926 and 550 tons in 1925. During 1926, 15,450 passengers, or 61 per cent of the total carried across the channel, flew in British planes. Goods valued at £8,124,240 were imported or exported by these planes, which also carried £8,283,498 in bullion and gold and silver coins.

The Imperial Airways, with an authorized capitalization of £1,000,000, had outstanding capital stock valued at nearly £473,000 on March 31, 1927, when its investment in aircraft and engines stood at £255,039. Other property stood on the books at smaller values. The net operating income (including subsidy receipts) for the fiscal year ended on that date was £54,313, compared with a loss of £21,749 for the preceding year.

Greece

Greece is a member of the International Convention for Air Navigation. Military aviation is under the Ministry of War, Direction of Aviation, headed by Col. Ch. Adamides, and under the Ministry of Marine, Direction of Aviation, headed by Captain Voulgaris. Civil aeronautics is in the office of Air Transportation under the Ministry of Communications. There is a National Technical University under the Ministry of Communications of which Dr. Phrixos Theodorides is Professor of Aeronautics.

Appropriations for military and naval aviation are made chiefly by an autonomous organization under state control called "Aeropiriki Amyrna" of "Air Defense" and headed by a board of directors composed largely of government officials and bank directors. Its income is derived from lands ceded by the government and it deals with the government through the Ministry of War. The organization appropriated 100,000,000 drachmas (about \$1,333,000) for the two military air services for the year ended March 31, 1927, and the same sum for the following year. The fund is divided between the services at the ratio of 7 to 3 and is used for all expenses in connection with aviation.

The government has a factory for the construction and repair of aircraft, which a British company will operate in accordance with its contract until June 1, 1930. The Ministry of Marine, according to the contract, pays the salaries and wages, plus a percentage of these payments for general expenses, and the cost of materials, plus a percentage of both, for the company's profit. The company is obligated to manufacture airplanes, seaplanes and parts, and to repair the government aircraft; and it may, with permission of the government, manufacture aircraft for commercial purposes. More than \$600,000 were expended by the government during the fiscal year 1925-26 for the purchase of airplanes, engines, spare parts, materials and accessories.

A French company and an Italian company have contracts with the government for the operation of civil air services across Greece. The Italian company has constructed an airport for its seaplanes at Athens and maintains a twice-weekly service between Constantinople and Brindisi, Italy, via Athens, 892 miles. Six Dornier-Wal and 2 Savoia twin-motored seaplanes are used.

Haiti

Haiti has no laws regulating civil aeronautics and there are no services offered by the government. The United States Marine

Corps carries officials and mails for the United States and the Haitian governments between the military landing fields of Port-au-Prince, Hinche and Cape Haitien. Hangars and meteorological information are available at the Marine Corps base at Port-au-Prince.

A commercial service between Port-au-Prince, Santo Domingo and San Juan (see section on the Dominican Republic) began operation in December, 1927.

Honduras

The Central American Air Line, a company formed in Tegucigalpa, in 1926, has stopped all operation. The Tela Railway Company, which maintained an air mail and passenger service between Tegucigalpa and Tela, stopped operating its craft during part of the year 1927, but a new six-passenger American plane was delivered late in the year. It then began operating between Tegucigalpa and Tela, making the flight in 1 hour, 30 minutes. The trip by other means would require two days. In addition to the passengers and goods of the private company, the plane carried some mails, public passengers and public goods.

Hungary

Owing to treaty restrictions, there is no military aviation in Hungary but the Government encourages by subsidy and otherwise, commercial aviation. It has under its direct control the Royal Hungarian airplane repair shop at Sósó, the aviation field section of the Royal Hungarian Gendarmerie, the Royal Hungarian Aerial Navigation School and the Aerial Meteorological establishment of the Ministry of Commerce. Commercial aviation is regulated through the Aerial Bureau of the Ministry of Commerce and has been aided by subsidies aggregating \$225,621 for the fiscal year 1926-1927. There are four commercial companies operating in Hungary, as follows:

1. The Magyar Légiforgalmi between Budapest and Vienna, 174 miles, and between Budapest and Graz, 199 miles. Six Fokker F-111 type of planes with 185 to 230 H. P. engines are used.

2. Nemzetközi Légiforgalmi, which operates a daily round trip service between Paris and Constantinople with intermediate stops at Vienna, Budapest and Belgrade. Six different types of French planes are used in this service.

3. The Deutsche Luft Hansa, which operates a daily service between Budapest and Vienna, a distance of 174 miles.

4. The Oesterreichische Luftverkehrs, which maintains a daily service between Graz and Budapest, 199 miles.

During 1927 these various lines carried 4,972 pounds of mail, 58,557 pounds of newspapers, and 510,717 pounds of merchandise. They carried 13,986 passengers and flew a total of 449,909 miles. The merchandise rates are very low, being about six cents a pound between Budapest and Vienna, five cents a pound between Budapest and Graz, and 2 cents a pound between Budapest and Belgrade.

Iceland

The Governor of Iceland is considering the establishment of an airplane, air mail service from the Reykjavik to the various parts of the island, and for this service has entered into negotiations with the Luft Hansa of Germany.

India

The Royal Air Force in India is commanded by the air officer in command in India, who is an Air Vice Marshal, but who is also under the control of the Commander-in-Chief in India. There is no naval aviation. Until recently civil aviation was under the air board of the government but that has been abolished and a Director General of Commercial Aviation, who controls all civil aviation, was appointed in 1927. The Director of Civil Aviation is Col. F. E. Shelmerdine. The government's estimates for the fiscal year ended March 31, 1928, allow approximately \$10,000 for the office of the Director of Civil Aviation, about \$55,500 for the establishment of an air route across India and about \$148,000 for the construction of an airship base at Karachi. Approximately \$376,000 was voted in March, 1927, for the construction of airports, and the government's policy was declared to be to aid in the development of air transportation, to give every assistance to private companies by establishing airports and providing meteorological and wireless services, as well as any other assistance which may become possible. The sum of \$5,400,000 has been spent in the provision of an airship base at Karachi, and additional sums will be voted for the airship service which is expected to begin late in 1928, between Great Britain and India.

The government made an agreement with the Imperial Airways, Ltd. of London for a regular airplane service between Cairo, Egypt, and Karachi, India, which was planned to be inaugurated in January, 1927. The service has been operating between Cairo and Bagdad, but has not been extended to Karachi.

The Indian Airways, Ltd. was formed in Calcutta, with a capital of approximately \$360,000, and it is expected that the government will lend assistance to the company in a service to be inaugurated between Calcutta and Rangoon.

The Indian Forest Service is using airplanes for surveying, and the Burma Oil Co. has had its oil fields photographed by the Air Survey Company, Ltd. of London.

There are no factories or assembling plants in India. The only civil airport is that at Karachi and it measures about 900 yards square. There is one hangar and one airship shed, together with a mooring mast.

Italy

Italy is a member of the International Convention for Air Navigation and has treaties with other countries regulating civil air transportation. The Italian-German air traffic agreement was ratified by Germany in November, 1927. A number of laws regulate aviation within the country; among them, Royal Decree No. 356 dated January 11, 1925, and Royal Decree No. 325 of January 23, 1927. Royal Decree No. 232, of October 26, 1927, grants certain facilities to Italian air transportation companies, and Royal Decree No. 1224, of June 9, 1927, prescribes regulations for the military requisition of private aircraft in time of national emergency. All aviation is directly under the Air Ministry, which is on a par with other ministries of the Italian government. Premier Mussolini is Air Minister. He is assisted by an Under Secretary of State for Aviation, General Italo Balbo, who supervises all air activities, and is assisted by a chief of staff directly under him charged with problems of military aviation, both land and sea. Other high officers are: General Armando Armani, the Under Chief of Staff; General Pier Ruggero Piccio is the Chief of Staff; General Rodolfo Verduzio is Chief of the Engineering Division; General Federico Falcolini is Chief of the Commissariat Corps; Commendatore Manlio Molsenz is Chief of the Air Traffic Bureau. All Italian air activities taken as a group are known as the "Regia Aeronautica" (Royal Air Force).

Appropriations for fiscal year in thousands of lire* are:

	1923-24	1924-25	1925-26	1926-27	1927-28
General expenses.....	4,085	6,041	19,283	28,610	29,060
Military personnel	40,050	77,800	74,922	123,010	127,960
Civil personnel.....	1,850	3,892	6,752	11,040	10,640
Rations, equipment.....	10,000	39,838	53,488	86,550	88,000
Schools	7,000	22,000	23,330	28,000	29,150
Buildings, fields.....	23,000	68,220	78,333	85,600	78,300
Aircraft, fuel.....	173,403	236,985	287,080	306,138	301,060
Civil aviation.....	1,000	7,000	13,825	31,030	35,830
	260,388	461,776	559,013	699,978	700,000

*Gold lire is worth 19.3 cents.

Additional funds for colonial aviation are paid by the Ministry of Colonies.

The Air Ministry grants liberal subsidies, provides meteorological information, the free use of army airports and army communication facilities, and other aids. There are 14 manufacturers engaged in the building of aircraft and aircraft motors. Six manufacture land planes; four, seaplanes; two, airplanes and motors; and two, motors.

The Genoa-Rome-Naples-Palermo line, 665 miles in length, was operated by the *Societa Anonima di Navigazione Aerea*, of Genoa, in 1926 and 1927. The company was allowed two forms of subsidy, 300,000 lire annually for carrying 17,000 kg. of mail and 14 lire per km., during the first four years. The average subsidy thus figured is about 50 per cent of the estimated operating cost. The company used 19 Dornier-Wal all-metal two engined seaplanes, each carrying 10 passengers, 3 crew members, baggage, goods and mail. Nine pilots and five mechanics were used in the tri-weekly service. During 1926, 1,941 passengers, 213 kg. of mail, 14,569 kg. of goods and baggage were carried during flights totalling 171,905 km.

The *Societa Italiana Servizi Aerei*, of Trieste, operated between Turin, Pavia, Venice and Trieste, 375 miles, between July 1 and October 15, 1926, and started again on March 16, 1927. Between those periods, the company operated between Trieste, Brioni, Lussinpiccolo and Zara, 160 miles, the service in both instances being daily. The company's mileage subsidy was 11.44 lire per km., with a maximum of 328,000 km. to be flown annually and a mail subsidy of 500,000 lire per annum, for carrying a maximum of 28,500 kg. plus 15 lire and 25 lire for local and foreign mail per kg. above the maximum amount fixed. The company used 10 "Cnt-10" triple motored seaplanes, 6 pilots and 6 mechanics. The operating results for 1926 show 1,589 hours of flying, over 238,262 km., carrying 1,588 passengers, 1,184 kg. of mail and 13,470 kg. of baggage and goods.

The *Societa Anonima Aeroepresso Italiano*, operated between Brindisi, Athens and Constantinople, 893 miles, using 6 Dornier-Wal and 2 Savoia-55 twin-motored seaplanes, 12 pilots and 10 mechanics. The service was operated once weekly during 1926, and twice weekly in 1927, and like all the others carried passengers, mail and goods. The company's subsidy was fixed at 16.8 lire per km. flown, plus 1,000,000 lire annually for carrying a maximum of 15,000 kg. of mail and 800,000 lire annually for the maintenance of the craft. From August 1 to December 15, 1926, 56,366 km. were flown, 138 kg. of mail, 5,002 kg. of merchandise and baggage and 57 passengers were carried. In 1926, 233,148 km. were flown and 454 passen-

gers, 1,137 kg. of mail and 22,350 kg. of goods and baggage were carried.

The Societa Transadriatica operated between Rome and Vienna, 642 miles, via Venice and Klagenfurt. Three Junkers F-13 single-engined, 6-passenger and 2-pilot planes and one Junker G-23 3-engined, 12-passenger and 2-pilot planes, all monoplanes and all-metal, were used, with five pilots and two mechanics. Between Venice and Vienna, airplanes of the Austrian Air Transportation Company, flew in co-operation with those of the Transadriatica Company. The Italian company's subsidy was 6 to 12 lire per kilometer flown, plus 10 lire per kg. of mail, with a minimum of 50 kg. allowed for each flight. In 1926, 532 passengers, 37 kg. of mail and 7,867 kg. of goods and baggage were carried.

Operating statistics for all civil air transportation in Italy for the year 1926 and the first 9 months of 1927, are given in the following table:

	Operating Results	
	1926	1927 First Nine Months
Miles flown	324,859	613,744
Hours flown	3,524	7,333
Passengers carried (local)	5,142	10,094
Passengers carried (through)	3,991	7,681
Mail carried (lbs.)	3,463	8,307
Goods and baggage (lbs.)	90,183	229,442

The Aero Lloyd Italiano was formed early in 1927 with a capital of 50,000,000 lire, with the intention of absorbing several of the commercial lines and opening new lines to France, Switzerland, Germany, Austria and other countries. In May of 1927, it was reported that an air consortium had been formed in Rome for the purpose of building, trading in, and operating airplanes and seaplanes, and to participate in other aeronautical enterprises. It was said that three steamship companies, an industrial group and a banking group, would subscribe to a capital amounting to 20,000,000 lire.

New services have been announced to begin operation between Rome, Milan and Treno Region, between Rome and Paris, and between Rome and several German cities.

Japan

Japan is a signatory to the International Convention for Air Navigation and has some laws regulating aviation, including one providing regulations for the quarantine of aircraft coming from foreign countries or areas infected with certain diseases. This law became effective September 1, 1927.

Little progress was made in the development of civil aviation in Japan until the last year. The explanation for this is given by Maurice Holland, in his work, "The Industrial Transition in Japan," as follows:

"In the opinion of officials of the Bureau of Civil Aviation the limited development of civil aviation in Japan may be attributed to the following reasons, in the order of their importance: First, the initial attempts to operate commercial lines were made with converted military and naval aircraft, which were wholly unsuited to the purpose, and made profitable operation impossible. It has taken five years to use up this surplus war material. It is only now that sufficient economic pressure has developed to encourage manufacturers to undertake the design and construction of a purely commercial type of plane with any hope of sufficient volume of sales to pay development costs. Second, the general topography of the Empire—almost 85 per cent mountainous country, rivers, lakes, forests and waste land, and 50 per cent of the remainder devoted to rice lands—is a serious handicap to safe and regular operation, except with water type equipment. Third, distances between important commercial and industrial centers on the main island of Honshu are so short that competition with the present modes of transportation, particularly government railways, restricts the margin of profit within small limits."

However, late in 1926, it was proposed that 7,000,000 yen be spent over a period of seven years for the establishment of new air services, and that the government grant 20,000,000 yen in subsidies to an operating company or companies over a period of eleven years. These figures were reduced to final estimates, which called for an expenditure of 628,000 yen for preparatory work and 12,000 yen for investigation of company organization and administration. The Minister of Communications was expected to obtain land and start the erection of hangars at Osaka and Fukuoka in 1927. A recent appropriation for the Japanese Bureau of Aeronautics has been reported at 1,216,796 yen, approximately \$572,867, of which 371,000 yen was allocated to subsidies and the remainder to the purchase or lease of airports at Tokyo, Osaka and Fukuoka, the improvement of these airports, and lesser items. It is expected that approximately 2,000,000 yen or \$946,600 will be spent by the government on an airport for Tokyo.

A company will be organized with a capital of 10,000,000 yen according to a recently reported plan of the Department of Communications. Services would be provided between Tokyo and Dairen via Osaka, Fukuoka and Keijo, and between Osaka and

Shanghai via Fukuoka. Purchases of 29 planes and 31 extra engines are contemplated.

Jugo-Slavia

The Aero Club of Belgrade has obtained a ten-year concession providing a subsidy of 26 dinars for each kilometer operated. Thereupon the Air Traffic Company was organized, which line is from Belgrade to Zagreb, and will require a subsidy of 4,500,000 dinars for the year. The government remits the duty for machines imported for this service. The capital of the company is 7,918,250 dinars, which are valued at .0176 cents each.

Latvia

Regulations governing aviation in Latvia published in 1926 contain all details in connection with the operation of national or foreign aircraft over national territory. Military aviation, army and navy, is under the Ministry of Defense, naval aviation being controlled by the naval commander, who is directly subordinate to the army commander. Civil aviation is under the Ministry of Communications in the Post and Telegraph Department. There were no appropriations for commercial aviation in 1927. The only governmental expense in connection with aviation is that of maintaining the airport at Riga, which is borne jointly by the National Government and the city of Riga. The Riga airport measures 2,500 by 2,000 feet. There are no hangars or lighting facilities. A customs officer attends the arrival and departure of aircraft when necessary.

The Finnish Air Transport Company operated between Helsingfors and Riga from August 10 to September 10, 1927. The Deruluft Company operated between Berlin and Moscow via Riga July 15 and September 10, 1927, after which the service was operated via Kovna, Lithuania. Riga is to become a junction point on two air routes—Berlin to Moscow and Berlin to Leningrad.

Mexico

Military aviation is under the Departamento de Aviacion Militar, which is a branch of the Mexican War and Navy Department. There is no naval aviation. Civil aviation is under the Departamento de Aviacion of the Mexican Department of Communication and Public Works. This department was organized in 1927 but no special appropriation was made. Brig.-Gen. José Luis Amezcua is the chief of the military department of aviation in the War and Navy Department, and Engineer Juan Guillermo Villasana is the chief of the civil department of aviation. The 1926 budget carried

1,000,000 pesos for military aviation. The sum of 528,000 pesos was set aside in addition for the purchase of aircraft in England. New postal rates were put into force January 21, 1928, which are expected to result in a fund of 1,200,000 pesos during 1928, which will be devoted to the development of commercial aviation. Of this sum, 50,000 pesos will be used for a school of aeronautics under the direction of the new bureau of civil aviation. The sum of 150,000 pesos will go to purchase land adjoining the military airport at Mexico City and 500,000 pesos will be invested in shares of commercial air transportation companies which are expected to be organized shortly.

Concessions were granted recently to the *Compañía Mexicana de Aviación S.A.*, for an air service between Mexico and Brownsville via Tampico. The Mexican Pan-American Airway S.A. of Mexico City was given a concession for a service between Mexico and a point on the Guatemalan border via Puebla, Tehuacan, Oaxaca, San Jeronimo, Tuxtla, Gutierrez, San Cristobal and Comitán. Mexican army landing fields will be used. Several other services have been proposed and some additional concessions have been granted by the government. The War Department maintains the national airplane factory at which five planes may be manufactured per month.

The only civil air transportation company operating in Mexico is the *Compañía Mexicana de Aviación* of Tampico which carry passengers, valuables, and other goods between Tampico and Mexico City and other cities as the needs require. No subsidy is granted the company by the government, but it is exempted from import duties on its aircraft supplies, etc., and from certain other duties and all taxes. On December 31, 1927, the company operated four Lincoln Standard two-passenger planes, two of which have 150 H. P. Hispano-Suiza motors and two of which have 180 H. P. Hispano-Suiza motors, and one Fairchild cabin monoplane, four-passenger, with a 220 H. P. Wright motor. These planes were flown 2,175 hours and 58 minutes during the year 1927; 1,828 flights were made during this time covering 147,000 miles. In 1926 the company's craft made 1,622 flights during 1,619 hours, covering 97,178 miles. During 1927 1,265 passengers were carried, 464 flights were made for taking photographs, 23 flights were for transporting goods and 159 flights for carrying money for pay rolls.

A civil aviation school is maintained near Mexico City by a German citizen. A Mexican citizen has one airplane in which he makes commercial trips to nearby cities. In 1927 a concession was granted to the *Compañía Naviera Aera del Golfo de Mexico* to establish a

service between Vera Cruz and Progreso. No attempt has been made since to inaugurate the service.

A great deal of interest has been aroused in Mexico and it is expected that civil air services will be in operation shortly.

The Netherlands

The Netherlands is not a signatory to the International Convention for Air Navigation but has certain treaties regulating the new form of transportation, including those with Belgium and Norway.

Military aviation is administered by the Department of War under the more direct supervision of the General Staff. Naval aviation, under the Navy Department, is administered in detail by the Aeronautics Bureau. All commercial aviation is controlled by the air navigation division of the Department of Public Works. Lieutenant-Colonel Donk of the General Staff is personally concerned with military aviation. Lieutenant-Colonel Hardenberg is commander of the Army Air Force. Admiral Zeeman, chief of material, is directly responsible for naval aviation. Officers of the Air Navigation Division of the Department of Public Works who are concerned with civil air transportation are Mr. Schonfeld, Mr. De Veer, and Dr. Wolff.

Appropriations for the military air service for the calendar year 1927 were 2,274,054 florins; for the naval air service 852,050 florins. Following an agreement between the government and the Royal Air Transportation Company reached in the summer of 1927, 2,800,000 florins, equivalent to \$1,120,000, will be paid to the company as a subsidy during a period of seven years and the government subscribed for 500,000 florins of capital stock. As a condition precedent, the company was required to raise an additional capital from private sources amounting to 500,000 florins. The capital will be 2,500,000 florins, of which the government will hold one-fourth. As a result the government obtained the right to a voice in the control of the company, especially in the fixing of air services and the requirement that aircraft be purchased in the Netherlands. The actual subsidy for the year 1927 was fixed at 500,000 florins and during the year the government appropriated 100,000 florins for the immediate purchase of 100 shares of the company's capital stock.

There are three manufacturing companies in the Netherlands, the largest of which is the Netherlands Airplane Works of Amsterdam. The two small companies are Pander and Zoof at The Hague, and Airolanda Airplane Company at Rotterdam.

A national aviation school was opened at the airport of Rotter-

dam on September 10, 1927, under the auspices of the Royal Aviation Association, the Royal Aero Club, and others.

The Waalhaven flying field, which serves the city of Rotterdam, is located three kilometers from the city and measures approximately 2,800 by 2,200 feet. The other civil airport in the Netherlands is the "Schiphol," provided by the city of Amsterdam. The estimated operating expenses for 1928 including the interest on invested capital was figured at 120,000 florins. The field measures 2,500 by 2,200 feet.

The Royal Air Navigation Company of The Hague (*Koninklijke Luchtvaart Maatschappij*) operated in 1927, between Amsterdam, Rotterdam, Brussels and Paris, 284 miles; between Amsterdam, Rotterdam and London, 249 miles; and between Rotterdam, Amsterdam, Hamburg, Copenhagen and Malmö jointly with a Swedish line, 475 miles. It operated the route between Amsterdam, Rotterdam, Brussels, Basel in co-operation with a Swiss company, 398 miles; and between Amsterdam, Bremen and Hamburg in co-operation with the German *Luft Hansa*, 220 miles; and a service between Rotterdam and Cologne was operated a short time with seaplanes. The services to Paris and London were maintained once daily throughout the year while two flights were made in each direction daily to Paris between May 2 and September 1, and two flights daily in each direction to London between June 15 and September 15. The service to Malmö was maintained daily with a flight of one company's plane one day and the other company's plane the following day between April 19 and September 30, 1927, except between June 4 and September 5; when each company operated one plane in each direction. The service to Basel was maintained by a flight in each direction daily between May 2 and September 30.

At the beginning of 1927 the company operated 12 aircraft, five of which were Fokker F-VII 8-passenger planes with "Jupiter" air-cooled 420 H. P. engines, and 7 Fokker F-VIIa 8-passenger planes with "Jupiter" air-cooled 420 H. P. engines. Two additional planes similar to the 7 Fokkers, and one Fokker F-VII 15-passenger planes were under construction for the company's use.

Some passenger rates are as follows: Amsterdam or Rotterdam to London, 48 florins; to Bremen, 36 florins; to Hamburg, 48 florins; to Copenhagen, 88 florins; to Malmö, 98 florins; to Paris, 39.50 florins; to Basel, 60 florins. A uniform rate of 5 Dutch cents (equivalent to 2 United States cents) for postcards and 50 Dutch cents (equivalent to 20 United States cents) per 20 grams for all other mail is the air mail rate to European countries.

The 1927 summer traffic of the K. L. M. and connecting lines was 11,023 passengers compared with 5,495 in the season of 1926;

237,179 kilograms of goods compared with 150,028; 26,799 against 5,677 kilograms of mail; of which the company carried about 55 per cent, or 8,246 passengers, and 17,026 kilograms of mail in the summer of 1927. The purely foreign services were maintained by the British Imperial Airways, the French "Farman" line and the Deutsche Luft Hansa.

During the first six months of 1927, the passenger traffic to and from The Netherlands of all air services increased 60 per cent over that during the first half of the year 1926. Letter air mail traffic increased 600 per cent, parcel post 250 per cent and goods 18 per cent. For the Royal Air Navigation Company, the increases were 25 per cent on passenger traffic, 400 per cent on letter air mail and 100 per cent on parcel post.

Air traffic at the two airports of The Netherlands during the calendar year 1926 was reported as follows:

		<i>Passen- gers</i>	<i>Goods Kg.</i>	<i>Letter Mail Kg.</i>	<i>Parcel Mail Kg.</i>
Amsterdam	{ K. L. M.	3,702	131,011	850	2,299
	{ Foreign Lines	4,745	186,646	1,789	6,280
Rotterdam	{ K. L. M.	1,187	121,964	1,422	3,535
	{ Foreign Lines	161	8,337	192	1,129

Compared with 1925 the K. L. M. traffic showed an increase in the transport of goods of 30,000 Kg. and 550 in the number of passengers. The total air traffic shows an increase of 33 per cent for passengers and 17 per cent for goods. The combined mileage of all Dutch commercial operations in 1927 was double that of the preceding year.

The K. L. M., which has the right to operate in the Netherlands East Indies, has approached the government with respect to the opening of a regular air service between The Netherlands and The Netherlands East Indies. It is intended to start the service with eight planes so that a machine can leave each terminus of the line once weekly. It has been calculated that flying costs will be 90 florins per hour and the salaries for the crew of three members will be 36 florins per hour, while general expenses (including airports, insurance, advertising, etc.), estimated at 70 per cent of the total flying costs, were figured at 88 florins per hour, or a total of 214 florins per hour. The trip is estimated to last 90 flying hours on an average. It was further estimated that a total quantity of 500 kilograms of mail would be carried on each flight and that the government would be called upon for a subsidy of approximately 63,500 florins per year.

Netherlands East Indies

Military aviation is under the Department of War (Department van Oorlog, Bandoeng, Java). Naval aviation is in the Department of Marine (Department der Marine, Weltevrede, Batavia, Java). There is no government office controlling civil aviation but the equivalent of \$8,000 will be appropriated for such an office during the year 1928. Appropriation for the War Department for 1927 amounted to 1,803,273 florins compared with 1,747,239 florins for the calendar year 1926; 320,000 florins of the 1927 appropriation were to be spent for the purchase of store supplies and other necessities. Appropriations for the navy air service for 1927 amounted to 5,276,500 florins, of which 2,180,000 were for the purchase of aircraft. In 1926 the total was 4,703,800, of which the amount for equipment was 1,820,000.

Dependent upon a subsidy grant of 700,000 florins for five years, a tentative program has been adopted for air transport operations in The Netherlands East Indies:

1. Immediate exploitation, to begin on October 1, 1928, of the Surabaya-Batavia-Sabang line, one trip per week in each direction to connect with the incoming and outgoing mail steamers at Sabang, with possible landings at Medan and Singapore and eventually at other points.

2. In connection with the above, the creation of a weekly service between Amsterdam and Cairo to connect with the outgoing mail steamers at Suez and Port Said, and the British air service between Cairo and Karachi.

3. The study and establishment of complementary air connections in conjunction with the foregoing main lines. A line between Surabaya and Macassar would probably be one of the first to be considered.

4. The establishment of a line between Sabang, in north Sumatra, and Colombo, Ceylon, to connect with the mail boats for the purpose of expediting the transit of mails to and from The Netherlands.

5. The establishment of local lines and frequent service between Surabaya, Semarang and Batavia.

6. The establishment of a line from Surabaya to North Australia.

Newfoundland

The airport at Harbor Grace, connected with trans-Atlantic flying in 1927, is to be the terminal for an air mail service in the

United States. The plane is to take mail to steamships off the Newfoundland coast and convey it by motorboat to Harbor Grace and thence by airplane to the United States.

New Zealand

The New Zealand government is arranging for a series of air routes connecting that colony with Australia and outlying islands. The airplanes for the purpose are being built in England, and designed to carry twelve passengers each.

Norway

Norway is not a signatory to the International Convention for Air Navigation, but has a convention with Sweden for the regulation of air traffic between two countries. Military aviation is under the Ministry of Defense.

A daily service was provided between Oslo, Gothenburg, Copenhagen, Stettin, Berlin, Leipzig and Dresden between July 1 and October 1, 1927. The Deutsche Luft Hansa was the operating company, using Dornier-Wal seaplanes over a part of the route.

Panama

Panama is not a signatory to the International Convention for Air Navigation, but has a treaty with the United States which relates in part to the control of civil aviation. Panama also is interested in the international treaty being drawn up by the Pan-American Conference at Havana for the regulation of aeronautics between American countries. A decree has been promulgated by the government which requires that all aircraft in the republic must be registered annually between January 1 and 16, and must pay an annual registry tax of \$75.00. There are certain other provisions, including one requiring that no private airplane may fly over the territory of the republic without permission from the government, which shall be extended in accordance with the law of the country and with international treaties as prescribed in the decree.

There is no aviation activity except that of American military authorities in the Canal Zone.

Paraguay

The government recently made an agreement with the French Compagnie Generale Aéropostale, which will operate between France and Argentina, for an extension of its service from Buenos Aires, Argentina, to Asunción, Paraguay, via Rosario, Parana, Lapaz, Espuina, Goya, Bella Vista, Corrientes, Resistencia and Formosa.

Three flights will be made weekly in each direction, on Mondays, Wednesdays and Fridays. Latécoère Models 25 and 26 with water-cooled 450 H. P. Renault motors will be used. The concession is to last five years.

Persia

Persia is a signatory to the International Convention for Air Navigation and on November 23, 1927, signed an agreement with Soviet Russia for the regulation of air traffic between Pahlavi and Baku, which will permit travelers and goods to go from Teheran to Russian cities.

Col. Ahmed Khan Nakhitchedan, Chief of Aviation Bureau, Ministry of War, handles all matters relative to military aviation. More than half a million dollars was appropriated for military aviation between January, 1924, and August, 1926. The government has been authorized to pay a subsidy to an operating company of three krans per kilometer flown during the first eighteen months of operation. The total of this subsidy is expected to amount to some 4,000 toman, or approximately \$4,000.

The Junkers Flugzeugwerk A. G. of Dessau, Germany, obtained a five-year concession to run from January 29, 1927, for the operation of any commercial air services which may be authorized in Persia. A weekly service between Teheran and Pahlavi, 192 miles, was inaugurated February 11, 1927. A second service between Teheran and Quritu, via Hamadan and Kermanshah, was inaugurated March 15, 1927. Flights are made weekly in each direction over this route, extending 359 miles. The company employs seven Junkers F-13 and L-5 aircraft. Goods are carried at the rate of 1 sha (approximately $\frac{1}{2}$ cent) per kilogram per kilometer, and passengers at 1 kran (approximately 10 cents) per kilometer, 10 kilograms of baggage per passenger being carried free. The company's planes operate jointly with those of a Russian company between Pahlavi and Baku, and passengers and goods may reach Moscow from Teheran in three days. During the first four months of operation, 408 passengers, 7,311 kilograms of goods and baggage, and 100 kilograms of mail were carried, and the planes flew 42,090 kilometers in 322 hours.

Peru

Peru is not a member of the International Convention for Air Navigation and has no agreements with other countries on the subject. Regulations governing civil aviation were published in a decree of November 15, 1921. Military aviation, both Army and Navy,

are under the control of the National Director of Aviation. Lieut.-Col. Juan O'Connor, Director de Aviacion Militar, is director of military aviation with offices at Las Palmas, Chorrillos, Lima, Peru. Capt. H. Z. Grow, Director de Hydro-Aviacion, with offices at Ancon, Peru, is head of the naval aviation services. Appropriations for the calendar year 1927 for military, that is army aviation, amounted to 33,740 Peruvian pounds, equivalent to approximately \$155,000. The appropriations for naval aviation was practically the same in amount.

A service operated by the Navy between La Merced and Iquitos, which is via San Ramon, Puerto Bermudez, Masiea, and Contamana, was inaugurated January 1, 1928, and flights, each lasting three days, are made twice weekly. Peruvian Navy pilots fly in the machines which can carry two passengers in addition to the pilot and 400 pounds of mail or baggage. Six new American machines, two of which are land planes and four hydroplanes, are in service. They were purchased from the Keystone Aircraft Corporation of Bristol, Pa., by the Peruvian government. The land planes will use a base at La Merced, which has a good landing field, shop, hangars and other facilities. The seaplanes will be based at Iquitos where a large hangar, shops and other facilities are available. Mail, passengers, and goods are carried over the route of some 600 miles in three days, compared with twenty days by other means of transportation.

La Aviacion Commercial operates a cross country taxi service between several cities. One plane with a 160 H. P. motor capable of carrying two passengers and 450 pounds of goods is used. It has flown 35,000 miles and carried 300 passengers per year for three years. These figures were exceeded during the first eight months of 1927.

Five American planes have been used since January 1, 1927, in dusting more than 20,000 acres of cotton. Contracts were made late in 1926 for dusting this area and since that time additional contracts were made so that the actual areas dusted have increased considerably. The Huff-Daland Company, operating these planes, has just entered into a new contract which will require the employment of additional planes and personnel.

In addition to these operations a company has been doing some photographic work.

Philippine Islands

The Philippine Airways, Inc., has recently been formed with a capitalization of 100,000 pesos, approximately \$50,000, of which one-half was paid in at once. The company has been organized to

conduct a school for training pilots; maintain and operate passenger, mail, express and freight service throughout the Philippine Islands; engage in aerial photography, aerial surveys, exhibition flights; build airplanes and seaplanes of all classes; make airplane repairs; import and sell airplanes, seaplanes and all equipment or appliances pertaining thereto, and to engage in any other undertaking connected with aviation in the Philippines and generally to do all such other things and to transact all business as may be, directly or indirectly, incidental or conducive to the attainment of the above objects.

Poland

Poland is a signatory to the International Convention for Air Navigation and has some treaty arrangements with other countries. Military aviation is under the direct control of the Ministry of War, while civil aviation is controlled by the Ministry of Communication. In the 1927-28 budget the Ministry of Communication, charged with the development of civil aviation, is granted an appropriation of 6,500,000 zloty (one zloty equals 11 cents) of which 5,400,000 zloty will be distributed among the air transportation companies as a subsidy, based on flight mileage. For the immediately preceding year the total budget allowance was 3,900,000 zloty. Most of the Polish aircraft have been built of wood but experiments are being carried on with an all-metal plane which will be manufactured at the Bialo-Podlaska factory which will bear the trade mark of "Stemal." Several other factories are engaged in the production of aircraft for the military forces.

The Polish Air Transportation Company (*Polska Linja Lotnicza*) of Warsaw operates mail, express and passenger services between Danzig, Warsaw, Lemberg and Czernowitz, 525 miles; Vienna, Berno, Cracow, Lodz, Warsaw, 380 miles; Lemberg-Cracow, 190 miles; Cracow-Warsaw, 210 miles; and Cracow, Berno, Vienna, 250 miles. The first four services are operated daily throughout the year while the fifth is maintained by a flight three times weekly in each direction. Junkers F-13 monoplanes with BMW engines, made in Germany, are used. Some passenger rates are: Warsaw to Danzig, 65 zloty; Lemberg, 70 zloty; Cracow, 60 zloty; Lodz, 25 zloty; Vienna, 120 zloty; Czernowitz, 110 zloty. The Aero Company of Posen operates a service daily during the summer months between Posen and Warsaw, 180 miles. Farman six-passenger planes having 300 H. P. Renault motors are employed.

The Silesian Aviation Company (*Salankie Towarzystwo Lotnicze, S. A.*) was organized October 29, 1927, at Katowice for regular

services between that city and several others, including Lodz, Danzig, Warsaw and Posen.

The Ministry of Communication recently announced some details of plans for extending the air services of Polish companies during the 1928 summer season. Two so-called trunk line services over Poland which are contemplated are from Berlin to Moscow via Posen, Warsaw and Vilno, and from Lemberg to Angora via Bucharest and Constantinople. The Polish Air Transportation Company has negotiated with the Roumanian government and has in other ways made preliminary efforts in this direction.

Between January 1 and September 6, 1927, Polish civil airplanes made 2,503 flights covering 707,421 kilometers and carrying 5,856 passengers and 10,682 kilograms of goods.

The Polish Air Transportation Company, which completed five years of operation on September 1, 1927, has reported the following statistics:

<i>Year</i>	<i>No. Flights</i>	<i>Kilo- meters Flown</i>	<i>Passengers Carried</i>	<i>Mail Carried (Kg.)</i>	<i>Baggage and Goods Carried (Kg.)</i>
1922	271	104,688	659	295	9,410
1923	596	228,618	2,089	406	12,487
1924	1,470	379,462	2,791	657	30,209
1925	2,809	747,707	5,394	1,361	75,528
1926	2,815	830,381	6,704	716	158,116
1927	3,779	1,054,546	8,160	13,183	271,800
Totals	11,740	3,347,402	25,797	16,618	557,550

Portugal

Commercial aviation is regulated in Portugal by the Ministry of Commerce and Communications in accordance with a decree of April 27, 1927, regulating air navigation over Portuguese territory. The decree stipulates the requirements to be met by military and civil aircraft.

It was reported that the Union Aerea Española inaugurated a service between Lisbon and Madrid and Seville on April 29, 1927. Services were later inaugurated between the same cities by the *Servisios Aerios Portugueses*, on June 10, 1927. Flights are made three times weekly in each direction, 4 hours and 15 minutes being required between Lisbon and Madrid, compared with seventeen hours by the fastest train. The Lisbon-Seville flight requires 2 hours and 30 minutes.

Roumania

Aviation in Roumania is directed by the Ministry of War. An aircraft manufacturing plant was opened on October 11, 1927, at

Brasov, located 100 miles north of the City of Bucharest. It is expected that the plant will produce as many as 300 airplanes and 300 engines per year. Formerly aircraft were manufactured at the Astra Works, but that plant has been abandoned.

The postal authorities have arranged with the Ministry of War for the Army to maintain a service between Bucharest and Galatz, 123 miles.

The French company, the *Compagnie Internationale de Navigation Aérienne*, operate a service between Paris and Constantinople via Bucharest. The service was suspended on November 15, 1927, until February 15, 1928.

The National Government of Roumania maintains an airport at Bucharest known as the Baneasa airport. There are two hangars and some lighting facilities. Weather reports are available and other facilities provided by the government are more than sufficient for the traffic handled by the French company.

Russia

The principal direction of the air fleet of Russia is directly subordinate to the Military Council which has control of all forms of aviation. The Revolutionary Military Council is under the Council of Ministers, and directly under the Military Council is the Chief of the Air Fleet. Further down there are several officers of importance and all of them are aided by the Society of Friends of the Air Fleet, an organization of 4,000,000 members. There are six state airplane factories and the government lends aid in every possible way. All services are heavily subsidized and reserve officers serve as pilots in the machine.

There are three operating companies, the first of which is the *Deruluft*, the capital of which was supplied by the German *Luft Hansa* and Soviet Government. Fokker "III" and Dornier "Merkur" 600 H. P., all-metal, six-passenger airplanes are employed. The company's service between Berlin, Danzig, Koenigsberg, Kovno, Smolensk and Moscow, 1,143 miles, was maintained daily between July 16 and September 10, 1927. There have been changes in the route followed as well as in the services. The flight from Berlin at three o'clock in the morning is made in planes of the *Luft Hansa* which reach Koenigsberg at six in the morning. Moscow is reached in the middle of the afternoon. A great deal of mail is carried, as well as official passengers. The distance between Koenigsberg and Moscow is 733 miles.

The second company is the *Dobrolet*, which operates in *Turkestan* between Bukhara and Diushambe via Termaz, 454 miles; be-

tween Bukhara and Taschaua via Kiva, 334 miles; and between Werchnieudiensk and Urga via Attan Bulak, 375 miles. German planes as well as Russian ones are employed. Flights are made over the first and second routes four times a week in each direction except during the months December to February. The third route is flown over twice a week in each direction from May to October.

The Ukrovosdukhputz (Ukranian Air Navigation Company) operates between Moscow and Charkow, between Artemorst and Rostow Mineralniie Wodi-Grosnii Petrowsk-Baku and Tiflis, 1,813 miles. Junkers L-5 and other aircraft are employed. This company recently made an operating agreement with the Junkers operating company of Persia for the exchange of passengers, mails and goods between the two services. The two governments interested also signed an agreement late in 1927 covering such exchange.

During the fiscal year 1925-26 the aircraft on all regular Russian air lines completed 1,741 flights covering 1,313,120 kilometers, carrying 4,035 passengers, 84,561 kilograms of baggage and mail during 10,100 hours of flying.

Spain

Spain is not a signatory to the International Convention for Air Navigation, but has signed agreements with other countries. A convention was signed with Italy on August 15, 1927, to regulate air transportation between Genoa and Barcelona. In December, 1927, Spain signed an agreement with Germany regulating the exchange of air traffic between the two countries.

Regulations to govern air navigation were promulgated in Royal Decree No. 1,017 published August 17, 1927. Regulations were published in October, 1927, to provide for the governing of foreign aircraft compelled to land in Spain by force majeure. Military and civil airports are provided for in legislation effective in July, 1927.

Military aviation is regulated by the Ministry of War, naval aviation by the Ministry of Marine, and civil aviation by the Ministry of Labor, Commerce and Industry. The Aeronautics Office of the Ministry of Public Affairs was established to handle international relations concerned particularly with aeronautics. In order to bring about uniformity and united control, the Superior Aeronautic Council was organized among officials of the four government departments concerned, and a few other executives. General Soriano is head of the council. Col. Sr. Don Alfredo Kinderlan, Jefatura Superior de Aeronautica, is head of military aviation. Contra Almirante Sr. Don Joaquin Moutagut y Miro, Direccion de Aeronautica, Ministerio de Marina, is head of naval aviation.

The 1927 ordinary budget for aviation appropriated 20,225,000 pesetas as follows:

For administration, 100,000 pesetas; for Ministry of War, regular service, 17,045,000 pesetas; for Ministry of War, action in Morocco, 3,090,000 pesetas; for Ministry of Labor, Commerce and Industry, for registry and inspection, 20,000 pesetas. (A gold peseta is worth \$0.1930.)

An extraordinary budget was approved July 16, 1926, for the period July 1, 1926-December 31, 1936, by which the Ministry of War will be allowed 160,000,000 pesetas, and the Ministry of Marine 49,000,000 pesetas, for developing aviation. The army allowance was divided by years as follows: 1927, 10,000,000 pesetas; 1928, 12,000,000 pesetas; 1929, 14,000,000 pesetas; 1930, 18,000,000 pesetas; 1931, 18,000,000 pesetas; 1932, 17,000,000 pesetas; 1933, 21,000,000 pesetas; 1934, 20,000,000 pesetas; 1935, 20,000,000 pesetas; and 1936, 10,000,000 pesetas. These sums would be divided as follows: For the purchase of aircraft until 1,400 are in use, and the aid of industry until it can produce sufficient aircraft in an emergency, 120,000,000 pesetas; for hangars and aerodromes, 23,000,000 pesetas; for parts, 14,000,000 pesetas; armament, 2,000,000 pesetas; and radio telegraphy, 1,000,000 pesetas. The navy allowance would be 15,000,000 pesetas for stations at Mahon, Cartagena and Vigo; for equipment, 20,000,000 pesetas; and for a school at Barcelona and other items, 14,000,000 pesetas.

Recently the council approved a plan by which air services in Spain will be consolidated under the control of one company, which would receive a subsidy of 1,500,000 pesetas. It would be necessary, according to the plan, for such a company to have a capital stock of 4,500,000 pesetas. Companies already operating services would be allowed to continue fulfilling their contracts but extended periods would not be greater than for six months.

A regular service between Madrid and Barcelona was inaugurated on December 14, 1927. German Rohrbach aircraft of all-metal construction are employed. Each plane will accommodate ten passengers, two pilots, a radio operator and a mechanic. The flights, under the direction of the Sociedad Iberica de Aviacion, are made between the two cities in a little less than four hours. The passenger fare is approximately \$30. This service connects at Barcelona with a German service recently inaugurated which extends to Marseilles and connects with other services which reach German cities through Switzerland. The remaining services in Spain are those between Madrid, Seville and Lisbon; between Madrid and Seville; between Seville and Larasch in Spanish Morocco, and the

French service which connects Toulouse with Casablanca via Barcelona, Alicante and other points.

There are four aircraft factories in Spain, most of them building airplanes for the Spanish military service. On June 9, 120 of these Spanish built planes were christened with great ceremony by the Spanish government. Many of the planes are powered with 300 H. P. Hispana Suiza and Fiat, and 360 H. P. RR. motors.

The Spanish government has granted a concession to the Compañia Colon Aeronautica for a service by dirigible airship between Seville, Spain, and Buenos Aires, Argentine. The government is willing to pay 500,000 pesetas or about \$75,000 for each voyage, the maximum payments to be 6,000,000 pesetas per year, for a period of five years.

Straits Settlements

On the instigation of the Light Airplane Club of Singapore, the authorities have recommended a capital grant of \$60,000 and an annual subsidy of \$20,000 for commercial flying. Steps have been taken for the organization of the Eastern Airways, Limited, to operate a daily service between Penang, Port Swettenham and Singapore; operations are to begin with tri-motored metal airplanes with accommodations for 18 passengers. Four single motor planes, 450 H. P. each, with a capacity for 6 passengers, supplement this equipment. The trip between Singapore and Penang is to be made in 4 hours and 15 minutes.

Sweden

Sweden has treaties regulating civil air transportation with several of the principal European countries. All military aviation is under the Air Service, which is a subdivision of the Ministry of Defense. The Ministry of Defense has three main departments, Army, Navy and Air Service, each of which is independent and on a par with the others. Civil aeronautics is under the Ministry of Communication. The Air Traffic Board is the office of the Ministry of Communications directly concerned with all matters pertaining to commercial aviation. Gen. K. A. B. Amundson is Chief of Air Service; Mr. C. J. Carlberg, Under Secretary, Department of Communication, is Chief of Air Traffic Board; Capt. L. Hogberg, of the Air Service, is technical expert.

For the fiscal year ended June 30, 1926, the appropriations were: Army, 1,427,600 kroner; Navy, 968,200 kroner. Following the consolidation of the military services on July 1, 1926, the Air Service appropriation for the year ended June 30, 1927, totaled 6,326,600 kroner, including pay and allowance for personnel; for the year

ended June 30, 1926, appropriations for civil aviation amounted to 1,615,300 kroner; for the year ended June 30, 1927, the appropriation for civil aviation amounted to 1,039,500 kroner, of which the subsidy to one operating company amounted to 500,000 kroner. The company has continued to receive an annual subsidy of 500,000 kroner and the government continues to loan large sums for the purchase of equipment. (The kroner is worth \$0.2680.) In addition to the large loans for the purchase of economical equipment the government has provided excellent airports, particularly at Stockholm and Malmö, for both land planes and seaplanes, weather forecasting services, communication services and other aids. There is one manufacturing concern which has received encouragement from the government and has produced a large number of aircraft, many of which have been exported to several countries throughout the world.

The Swedish Air Transportation Company is the A. B. Aero-transport of Stockholm. Capt. Carl Florman is the manager. Services were maintained between Malmö, Copenhagen, Hamburg and Amsterdam, 448 miles, between April 19 and October 1, 1927. The company's planes alternated with those of the K. L. M. (The Royal Air Transportation Company of Holland). The Swedish planes flew on alternate days and the Dutch planes on the others. Between June 5 and September 3, each company flew one plane in each direction each day except Sunday. The second service of the company was that between Stockholm and Helsingfors, 259 miles. This service was maintained between May 1 and September 30, in co-operation with the Finnish Aerotransport. Between October 1 and November 15, 1927, the companies operated between Stockholm and Abo, Finland. Three motor planes built by the A. B. Flygindustri of Sweden and other aircraft are employed.

The regular air traffic conducted by Akta. Aerotransport was suspended for the winter months on November 15, with the closing of the Stockholm-Abo route. All other routes of this company were closed on October 1. During the entire flying season the company's planes flew 332,956 kilometers in 2,507 hours, as compared with 340,933 kilometers in 2,634 hours during 1926. The greater amount of flying during 1926 resulted from the maintenance of the Goteborg route for a longer period. However, the passengers carried during 1927 numbered 14,969 as against 10,176 during 1926, and baggage carried totaled 76,156 kilos and 57,745 kilos during these respective flying seasons.

On the Malmö-Amsterdam route traffic was maintained in co-operation with the Dutch company, Koninklijke Luchtvaart Maat-

schappij, and the combined traffic of these two companies shows the following results: 1926, 2,742 passengers and 54,549 kilos of baggage and freight; 1927, 4,035 passengers and 129,569 kilos. On this route the planes of Akbt. Aerotransport flew 161,005 kilometers and carried 1,080 passengers and 16,739 kilos of freight and baggage from Malmö to Amsterdam. On return trips they carried 873 passengers and 45,807 kilos of freight and baggage.

Traffic on the Stockholm-Helsingfors route was maintained by Akbt. Aerotransport in co-operation with the Finnish company, Aero O/Y, and shows the following results: 1926, 829 passengers and 11,731 kilos of baggage and freight; 1927, 1,190 passengers and 17,587 kilos. On this route the planes of Akbt. Aerotransport flew 56,600 kilometers (April 19 to September 30, 1927, inclusive). They carried 270 passengers and 4,685 kilos of freight and baggage on the return trips. There were practically no passengers during October, but service was maintained and about 120 kilos of mail was transported on each trip.

During the period October 1 to November 15, inclusive, traffic was maintained on the Stockholm-Abo route by Akbt. Aerotransport and the Finnish company, Aero O/Y. The planes of the former company flew 9,720 kilometers in 74 hours and carried 32 passengers and 641 kilos of freight and baggage. The planes of Aero O/Y flew 9,450 kilometers in 71 hours and carried 47 passengers and 1,022 kilos of freight and baggage during that six-week period.

Switzerland

Military aviation is under the War Department. Civil aviation is controlled by the office Aerien Federal, which is a part of the Ministry of Posts and Railways. Mr. A. Isler is director, and Mr. R. Fsell is head of the technical service of the office Aerien Federal. The cost of military aviation to the national government for the year 1928 will total 3,249,262 Swiss francs; a part of this sum will be used for the assistance of commercial aviation. In addition, several of the cantons and the cities grant special aid to commercial operating companies. The city of Zurich voted 120,000 Swiss francs for 1928. This sum is 50 per cent greater than the sum voted by the city for 1927. The city of Basel granted 65,000 francs, which is equal to its 1927 appropriation.

There are two air transportation companies in Switzerland. The first is the Ad Astra Aero Co. of Zurich, which maintains daily services during most of the year between Geneva, Lausanne and Zurich, 160 miles; between Zurich, Munich and Vienna; and between Zurich, Stuttgart and Berlin. Some of these services are maintained

in co-operation with the Deutsche Luft Hansa. The Balair Company (Basel Air Service Company) maintains services between Basel, Cheux de Fonds and Lausanne; between Basel and Geneva; between Basel and Zurich; between Basel and St. Gall; between Basel and Amsterdam in co-operation with the Royal Air Transportation Company of the Netherlands; and between Basel and Marseilles. The Imperial Airways of Great Britain operate between London, Paris and Basel. Several services are maintained between Germany and Swiss cities by the Deutsche Luft Hansa, and the French Air Union connects Basel with Paris and London.

Civil aviation statistics for Switzerland for 1927 show 740,290 kilometers flown by planes carrying 10,823 passengers, 47 tons of mail, 81 tons of goods, and 26 tons of baggage.

A conference of the International Air Traffic Association was held at Basel on August 12 and 13, 1927, during which time there was held an international flying meet at Zurich.

Turkey

Military aviation is under the Ministry of Defense as is also commercial aviation. There is an aviation league supported by the government and the public. This semi-official organization raises funds for the purchases of military aircraft for the government's defense forces. An airport at Constantinople which adjoins the military field is leased to the French Compagnie Internationale de Navigation Aérienne, which operates a daily service between Paris and Constantinople during the summer months. The first flight was on March 17, 1927. Leaving Constantinople in a two-passenger Bleriot-Spad plane at 2 P. M., one reaches Paris at 8 P. M. on the second day, the fare being approximately \$140. The Societa Anonyma Aeroespresso Italiano has a port for its seaplanes at Constantinople from which it maintains a service to Athens and Brindisi. The Deutsche Luft Hansa has secured authorization for its service between Constantinople and Germany, but it has not been inaugurated because similar concessions have not been obtained from all the interested countries.

Union of South Africa

South Africa is a member of the Convention for Air Navigation and the government ratified the most recent amendment to the Convention on August 16, 1927. Military aircraft have been used in making flights between Cairo, Egypt, and Capetown. Aircraft have been used for aerial photography, for fighting locusts and for mapping forests and other areas.

A number of light airplanes have been imported for the use of several flying clubs which have been formed recently in the principal centers of business.

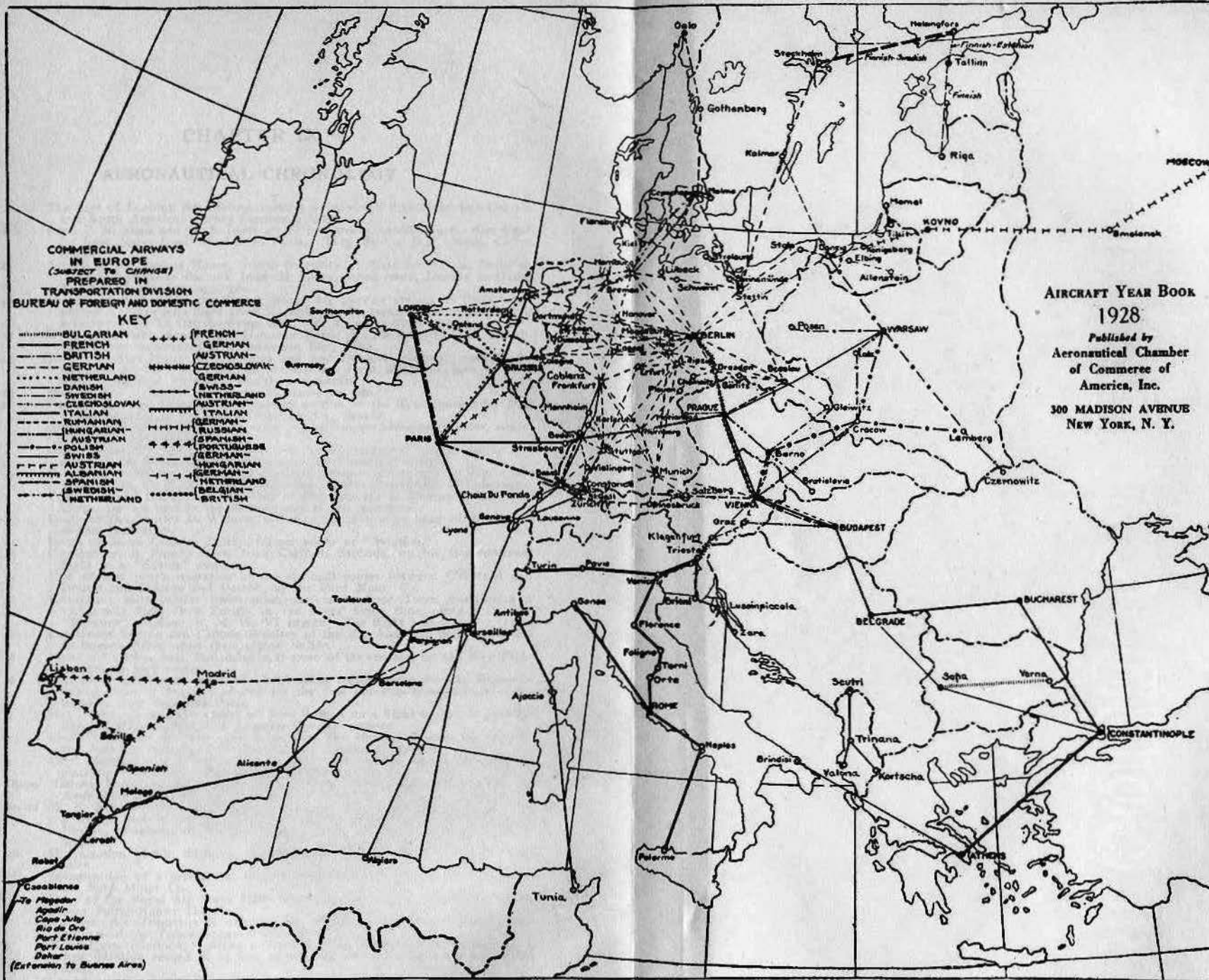
A regular service between Johannesburg and Durban for the carrying of mail and passengers is expected to begin early in 1928. The operating company will receive a subsidy of £8,000 annually for two years. Three flights in each direction will be made per week and each flight will require $4\frac{1}{2}$ hours compared with about 20 hours by train.

Uruguay

Uruguay is a signatory to the International Convention for Air Navigation and has signed an agreement with Argentina for the interchange of air traffic between the two countries. Military aviation is controlled by the War Department. There is no naval aviation. The French Latécoère Company inaugurated its South American service late in 1927.

Venezuela

Military aviation is under the Ministry of War and Marine. There are no commercial air services. Col. Daniel Lopez Henriquez is Director of the School of Military Aviation. Lieut. Robert Guerin is Technical Instructor of the school. Several military landing fields have been designated, but there are no large civil airports. Public interest is being shown in the development of air services and it is expected that Venezuela will be served in due time by regular commercial aircraft.



COMMERCIAL AIRWAYS IN EUROPE.

CHAPTER IX

AERONAUTICAL CHRONOLOGY

- Jan. 2 The fleet of Loening Amphibians, making a "good-will flight" through Central and South America, reaches Guatemala City.
- Jan. 8 Capt. T. N. Stack and M. S. Leete arrive in Karachi, completing the first flight by light plane from London to India. They flew a D.H. Moth, Cirrus engine.
- Jan. 8 Arrival of Sir Samuel Hoare, British Secretary of State for Air, at Delhi on the first flight over the new Imperial Airways mail route, London to Delhi. The flight began Dec. 27, 1926.
- Jan. 14 Lieutenant Bernard of the French Naval Air Service arrives in Paris, completing a 17,500 mile flight from Marseilles to Madagascar and return, using a Liore-Olivier Le OH-190 flying boat, with a Gnome-Rhone motor.
- Jan. 17 Twenty-five Navy planes leave Hampton Roads, Va., to participate in the annual winter maneuvers at Guantanamo Bay, Cuba.
- Jan. 24 Twelve Curtiss Hawk pursuit ships and one Douglas transport, manned by pilots of the 1st Pursuit Groups at Selfridge Field, Michigan, take off on a flight to Ottawa, Montreal, Buffalo and return.
- Jan. 25 New 20-cent U. S. air mail stamp is placed on sale.
- Jan. 28 Contract for the Chicago-San Francisco section of the Transcontinental Mail Route awarded to the Boeing Airplane Co., Seattle.
- Feb. 1 New air mail postage rate of 10 cents per half ounce becomes effective, superceding the zone rates.
- Feb. 5 Capt. George H. Wilkins leaves Detroit for his projected exploration by airplane of the North Pole regions, using two Stinson-Detroits.
- Feb. 7 Course of ten lectures on aviation medicine is begun by Georgetown University, Washington, D. C., with the co-operation of the Department of Commerce.
- Feb. 7 Collier Trophy for 1926 is presented to Maj. Edward L. Hoffman, Army Air Corps, for his part in the development of the parachute.
- Feb. 9 Death of Dr. Charles D. Wakcott, secretary and executive head of the Smithsonian Institution.
- Feb. 12 Death of Baron Ladislav d'Orcey, former editor of "Aviation."
- Feb. 13 Commander de Pinedo starts from Cagliari, Sardinia, on his four-continent flight in a "Savoia" seaplane.
- Feb. 15 End of first year's operation of the air mail routes between Cleveland and Detroit and Chicago and Detroit, by the Ford Motor Co.
- Feb. 20 Lieutenant Mittelholzer, Swiss pilot, arrives in Cape Town, completing a 12,500-mile flight from Zurich, in 100 hours' flying time, using a Dornier "Mercury" seaplane, B. M. W. VI engine. The flight began Dec. 7, 1926.
- Feb. 26 Lieutenant Benton and Captain Woolsey of the Pan-American flight are killed at Buenos Aires when their planes collide.
- Feb. 28 Pitcairn Aviation, Inc., Philadelphia, is awarded the contract for the New York-Atlanta air mail route.
- Feb. 28 Charles A. Lindbergh, air mail pilot, makes formal entry for the Raymond Orteig prize of \$25,000, offered for the first non-stop trans-Atlantic flight between New York and Paris.
- Mar. 2 Maj. Sarmiento de Beires takes off from Lisbon on a flight to Rio de Janeiro, flying a Dornier Wal with Lorraine-Dietrich engines.
- Mar. 5 Shirley J. Short, air mail pilot, is awarded the Harmon Trophy for 1926 by the American section of the International League of Aviators.
- Mar. 9 Capt. Hawthorne C. Gray sets a new American altitude record for balloons, reaching 28,510 feet at Scott Field, Illinois.
- Mar. 18-19 National Indoor Model Airplane Meet, Detroit, Mich., under direction of the Association of Model Airplane Clubs of America.
- Mar. 21-22 W. K. Schnabel and Fritz Loose (Germany) set new duration records with a useful load of 500 kg., flying a Junkers W-35, Junkers L-5 engine, at Dessau, remaining in the air 22 hrs. 11 min. 45 sec., and flying 1,699.81 miles.
- Mar. 26 Organization of the National Association of Balloon Officers of the World War.
- Mar. 28 Inauguration of a private air express route between Detroit and Buffalo by the Ford Motor Co.
- Mar. 30 Start of the Royal Air Force flight from Cairo, Egypt, to Cape Town, using four Fairey-Napier III F's.
- Apr. 2 National Air Transport is awarded the contract of the New York-Chicago section of the Transcontinental Mail Route.
- Apr. 4 Fritz Horn (Germany), flying a Junkers G-24, Junkers L-11 motor, sets a new duration record of 14 hrs. 23 min. 45 sec., carrying 1,000 kg. useful load.

- Apr. 6 End of first year's operation of air mail route between Salt Lake City and Pasco, by Walter T. Varney.
- Apr. 12-14 Clarence D. Chamberlin and Bert Acosta, flying a Bellanca monoplane, with Wright "Whirlwind" motor, set a new endurance record of 51 hrs. 11 min. 25 sec.
- Apr. 14 Lieut. G. R. Henderson, U. S. N., flying a Vought "Corsair," Pratt & Whitney "Wasp" engine, establishes an altitude record for seaplanes of 22,178 feet.
- Apr. 15 End of first year's operation of air mail route between Chicago and St. Louis by the Robertson Aircraft Corporation.
- Apr. 17 End of first year's operation of air mail service between Salt Lake City and Los Angeles, by Western Air Express.
- Apr. 21 Opening of contract air mail service between Pittsburgh and Cleveland by Clifford T. Ball.
- Apr. 23 Lieut. S. W. Callaway, U. S. N., flying a Vought "Corsair," Pratt & Whitney "Wasp" engine, sets new record for seaplanes with 500 kg. useful load, covering 100 km. at 147.263 m.p.h.
- Apr. 24 VT Squadron One returns to Hampton Roads, Va., from Guantanamo Bay, Cuba, having covered in winter maneuvers 100,000 flying miles without change in planes or motors (T3M Martin seaplanes, Wright motors).
- Apr. 25 Lieut. S. W. Callaway, U. S. N., sets a new world speed record for seaplanes with 500 kg. load covering 100 km. at 147.263 m.p.h., using a Vought "Corsair" with Pratt & Whitney "Wasp" motor.
- Apr. 25-26 Two-day meeting of the Aeronautic Division of the A. S. M. E. under the auspices of the Buffalo section.
- Apr. 26 Lieut. Comdr. Noel Davis and Lieut. Stanton H. Wooster are killed in the final tests of their plane *The American Legion* in which they planned to fly to Paris.
- Apr. 28 Inauguration of air mail service between Fairbanks and Wiseman, Alaska, the first ever operated north of the Arctic Circle.
- Apr. 29 Announcement of the Guggenheim Safe Aircraft Competition, with awards of \$150,000.
- Apr. 29 Aeronautical Chamber of Commerce holds a luncheon at the Waldorf-Astoria in honor of Commander de Pinedo.
- Apr. 30 Lieut. J. D. Barner, U. S. N., flying a Vought "Corsair," Pratt & Whitney "Wasp" engine, sets a new speed record for seaplanes for 500 km. of 136.023 m.p.h.
- May 2 Return to Washington of the four Pan-American Loening Amphibians under command of Maj. H. A. Dargue, after a flight of 20,500 miles through Central and South America, and the West Indies. The flight began Dec. 20, 1926, at San Antonio, Texas.
- May 2-5 All-American Aircraft Display, Washington, D. C., under the auspices of the Aeronautical Chamber of Commerce of America, Inc., and Pan-American Aviation Congress.
- May 4 Announcement by the Guggenheim Fund of a grant of \$5,000 to help finance the University of Michigan Greenland Expedition, to investigate atmospheric and climatic conditions with special reference to their effect on weather conditions over the Atlantic.
- May 4 Capt. Hawthorne C. Gray sets a new altitude record for all aircraft, reaching in his balloon a height of 42,470 feet over Scott Field, Illinois. The record is not allowed, as Captain Gray was forced to make a parachute jump.
- May 5 Lieut. C. C. Champion, flying an "Apache" seaplane, Pratt & Whitney "Wasp" engine, establishes an altitude record of 33,445 feet.
- May 5-8 Second California Aviation Conference, held at San Francisco.
- May 8 Capts. Charles Nungesser and François Coli take off from Le Bourget on an attempted flight to New York. The plane is lost at sea.
- May 10 Charles A. Lindbergh leaves San Diego on his one-stop flight to New York, in anticipation of a flight to Paris.
- May 11 Eighteen Curtiss pursuit planes from Selfridge Field, Michigan, fly to Kelly Field, Texas, a distance of 1,400 miles, in a total flying time of 11 hrs. 25 min., to participate in the combined maneuvers at San Antonio.
- May 11 G. Juterbock (Germany) sets new speed record for 1,000 km. for seaplanes with 500 kg. useful load, flying a Junkers W-34, Bristol "Jupiter" motor, at 112.695 m.p.h.
- May 12 End of first year's operation of the air mail route between Chicago and Dallas, by National Air Transport, Inc.
- May 18 Inauguration of daily passenger and express service between Cleveland, Ohio, and Louisville, Ky., by the Embry-Riddle Co.
- May 20-21 Charles A. Lindbergh, flying a Ryan monoplane, Wright "Whirlwind" engine, makes a non-stop flight to Paris, winning the Orteig prize. Distance, 3,610 miles; time, 33 hrs. 30 min.
- May 20-21 Flt. Lieuts. L. E. M. Gillman and R. C. Carr, in an attempt to fly to Karachi, India, in a Hawker Horsley, with a Rolls-Royce motor, reach a point in the Persian Gulf, 3,400 miles distant, setting a new world's distance record, only to lose it a few hours later to Lindbergh.
- May 21 Lieut. R. Irvine, U. S. N., flying a Vought "Corsair," with Pratt & Whitney "Wasp" motor, sets a new seaplane speed record over 1,000 km. making 130.932 m.p.h.

- May 23 Commander de Pinedo takes off from Trepassey, N. F., on a flight to the Azores, completing his four-continent flight.
- May 24 Joint Conference of the aircraft industry and the National Advisory Committee for Aeronautics, at Langley Field, Virginia.
- May 26 D. Antonini (Italy) sets a new altitude record with a pay load of 2,000 kg., flying a Caproni CA-73, with Isotta-Fraschini motors, to a height of 20,544 feet.
- May 29-30 American Elimination Balloon Race, starting from Akron, Ohio, is won by Ward T. Van Orman, for the third time, thus gaining permanent possession of the Litchfield Cup.
- May 31 End of first year's operation of the mail route between Pueblo and Cheyenne, by Western Air Express. (First eight months operated by Colorado Airways.)
- June 1 John Ristics (Germany), flying a Junkers W-34, Jupiter motor, sets a new speed record for 100 km. for seaplanes with 1,000 kg. useful load, making 121.836 m.p.h.
- June 4 Official opening of the Daniel Guggenheim School of Aeronautics at New York University.
- June 4-16 Fourth International Aeronautical Exhibition at Prague.
- June 4-5 Clarence D. Chamberlin, with Charles A. Levine as passenger, flies from New York to Eisleben, near Berlin, setting a new world's distance record of 3,911 miles. The plane was the Bellanca Wright-motored monoplane which established the endurance record April 14.
- June 5-20 Machine gun and bombing matches are held at Langley Field, Virginia, in which Air Corps pilots win all the events.
- June 7 End of first year's operation of the air mail route, Chicago to Minneapolis and St. Paul, by Northwest Airways.
- June 11 Colonel Lindbergh, returning on the "Memphis," is welcomed by Washington.
- June 13 New York stages spectacular welcome for Colonel Lindbergh.
- June 15 Mr. Van Lear Black, Baltimore publisher, begins his 19,000-mile air tour from Amsterdam to Batavia and return.
- June 16 Aeronautical Chamber of Commerce of America gives a dinner at the Waldorf-Astoria in honor of Colonel Lindbergh.
- June 16 Commander de Pinedo is welcomed at Ostia by Mussolini at the completion of his 25,000-mile flight.
- June 18 New Lindbergh air mail stamp is placed on sale.
- June 27 Start of the Third National Reliability Tour for the Edsel B. Ford Trophy.
- June 28-29 Lieuts. Lester J. Maitland and Albert F. Hegenberger, Army Air Corps, fly from Oakland, Calif., to Honolulu, the first successful non-stop flight across the Pacific. Their plane was a Fokker (transport C-2), with three Wright "Whirlwind" engines. Distance, 2,400 miles; time, 25 hrs. 50 min.
- June 29 J. Ristics (Germany), flying a Junkers G-24, three Junkers motors, sets a new duration record with a useful load of 2,000 kg., remaining in the air 13 hrs. 1 min. 12.8 sec.
- June 29-30 Comdr. R. E. Byrd and his crew fly from New York to France, landing offshore at Ver-Sur-Mer. The plane was a Fokker with three Wright "Whirlwind" engines. Distance, 3,477 miles; time, 41 hrs. 27 min.
- July 1 The Boeing Air Transport Company takes over the operation of the Chicago-San Francisco division of the Transcontinental Air Mail Route from the Post Office.
- July 1 End of the first year's operation of the air mail route between New York City and Boston by Colonial Air Transport.
- July 2 Eighth Royal Air Force Display at Hendon Airdrome, London.
- July 2-4 International Aviation Peace Jubilee held at Santa Ana, Calif., under auspices of the local air club and the Aero Club of Hollywood.
- July 4 Lieut. C. C. Champion, U. S. N., establishes a new altitude record for seaplanes at Anacostia, D. C., reaching a height of 37,995 feet in a Navy "Apache," with a Pratt & Whitney "Wasp" engine.
- July 4-5 Detroit News Trophy Balloon Race is won by S. A. V. Rasmussen who covered 572 miles, from Detroit to Hookerton, N. C.
- July 8 Lieuts. B. J. Connell and S. R. Pope, flying a PN-10, Packard motor, set new world duration and distance records for seaplanes with a useful load of 1,000 kg. and 2,000 kg., respectively, flying 11 hrs. 7 min. 18 sec., and a distance of 947.705 miles.
- July 12 End of Third National Reliability Tour for the Ford Trophy, when thirteen of the fourteen planes which entered the race returned to Detroit. Edward Stinson, flying a Stinton-Detroit with Wright "Whirlwind" motor, is the winner.
- July 13-14 Ernest L. Smith and Emory B. Bronte fly from Oakland, Calif., to a point 93 miles southeast of Honolulu, in an attempted flight to Wheeler Field, flying a Travel Air with "Whirlwind" motor. Distance, 2,348 miles; time, 25 hrs. 36 min.
- July 18 Return to New York of Commander Byrd with his crew, and Clarence Chamberlin after their flights to France and Germany, respectively.
- July 18 Richard Wagner (Switzerland), flying a Dornier "Merkur," B.M.W. motor, sets a new altitude record for seaplanes with 1,000 kg. useful load, reaching a height of 19,196 feet.

of the country under the auspices of the spirit of St. Louis.

reaches a height of 38,474 feet, flying a key "Wasp" engine, setting a new world's

speed records for 1,000 km. with a use- 500 and 1,000 km. with 2,000 kg. useful Rohrbach-Roland, three B.M.W. motors.

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on by Capt. W. L. Hope, in a D.H. Moth,

ce of America gives a luncheon at the eutenants Maitland and Hegenberger, Pa.

Rohrbach-Roland, three B.M.W. motors, eful load of 500 kg., and a distance record overing 1,438.680 miles at 127.632 m.p.h.; m. with 1,000 kg. useful load, and a dis- 1,087.68 miles.

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sets a new altitude record for seaplanes C.A.M.S.2, with Jupiter-Gnome motor, to

Rodd, flying a PN-10, with two Packard 27 lbs. to an altitude of 2,000 meters, set- eaplanes.

ddt take off from Oakland, Calif., on an d to search the course for the missing at sea.

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the carrying of express for the American ransport, National Air Transport, Boeing oress.

African Air Force flies from London to

off from Le Bourget on an attempted flight Blue Bird, but are forced to return by

Sept. 6 Lloyd Bertaud and James D. I off from Old Orchard, Maine, Old Glory, is lost at sea.

Sept. 7 Capt. Terry Tully and Lieut. N. F., on an attempted flight is lost at sea.

Sept. 7-10 Army-Navy Standards Conference, teriel Division, Wright Field,

Sept. 12 First strictly service awards of citations are forwarded to L work on the Alaskan aerial st well, U. S. N., for heroism Hampton Roads, Va., Nov. 1

Sept. 12 Gordon Bennett Balloon Race st Hill and A. G. Schlosser who

Sept. 15 End of first year's operation of Angeles, by Pacific Air Tran

Sept. 15 Announcement of the Daniel G ology.

Sept. 16 Capt. R. H. McIntosh and Com Air Force take off from Dubl plane is lost at sea.

Sept. 17 Edward F. Schlee and William Tokyo for San Francisco, ha not attempt the long oversea the United States. They had hours.

Sept. 18 Opening of passenger service l Services.

Sept. 19-20 Sixth annual convention of the Mo.

Sept. 19-21 National Air Derby from New Pacific Coast Air Derby from S

Sept. 21 First aerial tour conducted in off from Curtiss Field for a Fokker monoplane with Wri

Sept. 23-24 National Air Races, Spokane, V Schneider Cup Race, held at the British team, flying a S speed of 281.488 m.p.h.

Sept. 29 Distinguished Flying Cross is p berger for their successful tr

Oct. 1-10 Lieut. A. Koppin of the Dutch Batavia, 8,750 miles in 75½ Armstrong-Siddely engines, in Holland and the Dutch East

Oct. 4 Jarkes G-24 seaplane takes of New York by way of Lisbon passenger. The flight is later

Oct. 5 Aeronautical Chamber of Com election of officers and govern

Oct. 8 Miniature aircraft tournament,

Oct. 10 Continental Air Lines of Cleve mail route between Cleveland and Cincinnati.

Oct. 10-11 George Haldeman, pilot, and Ru attempted flight to Paris, but northeast of the Azores. The of 2,623 statute miles.

Oct. 10-20 Lieutenants Costes and LeBrix to Buenos Aires, using a Bre made at St. Louis, Senegal. 2

Oct. 12 Dedication of Wright Field, Day

Oct. 12 Curtiss Pursuit Plane Race for is won by Lieut. I. A. Wo 158,968 m.p.h.

Oct. 13 A. Jesek (Czecho-Slovakia), fly a new speed record for 500 k making 143.492 m.p.h.

Oct. 15 Capt. W. N. Lancaster and Mr in an Avro "Avian."

Oct. 16 Death of Charles M. Manly, pi

Oct. 17 R. A. F. two-year service flight Supermarine Southampton fly

Oct. 18-20 Annual Aeronautic meeting of York City.

Oct. 22 Conference called by Postmast postage rates on parcels sent

- Sept. 6 Lloyd Bertaud and James D. Hill, with Philip A. Payne as passenger, take off from Old Orchard, Maine, in an attempt to fly to Rome. The plane, *Old Glory*, is lost at sea.
- Sept. 7 Capt. Terry Tully and Lieut. James Medcalf take off from Harbor Grace, N. F., on an attempted flight to London. The plane, *Sir John Curling*, is lost at sea.
- Sept. 7-10 Army-Navy Standards Conference meets at the headquarters of the Materiel Division, Wright Field, Dayton.
- Sept. 12 First strictly service awards of the Distinguished Flying Cross are made when citations are forwarded to Lieut. B. H. Wyatt of the Air Corps for his work on the Alaskan aerial survey in 1926; and to Lieut. Delbert S. Cornwell, U. S. N., for heroism during a flight at the Naval Air Station, Hampton Roads, Va., Nov. 18, 1926.
- Sept. 12 Gordon Bennett Balloon Race starts from Detroit, Mich., and is won by E. J. Hill and A. G. Schlosser who landed at Bixley, Ga., 725 miles distant.
- Sept. 15 End of first year's operation of the air mail route between Seattle and Los Angeles, by Pacific Air Transport.
- Sept. 15 Announcement of the Daniel Guggenheim Committee on Aeronautical Meteorology.
- Sept. 16 Capt. R. H. McIntosh and Comdr. J. C. Fitzmaurice of the Irish Free State Air Force take off from Dublin on an attempted flight to New York. The plane is lost at sea.
- Sept. 17 Edward F. Schlee and William S. Brook, round-the-world flyers, sail from Tokyo for San Francisco, having yielded to numerous requests that they not attempt the long oversea hop to the Midway Islands, and thence to the United States. They had flown 12,295 miles, in 18 days, or 145½ flying hours.
- Sept. 18 Opening of passenger service between Detroit and Cleveland by Stout Air Services.
- Sept. 19-20 Sixth annual convention of the National Aeronautic Association, St. Joseph, Mo.
- Sept. 19-21 National Air Derby from New York to Spokane, Wash.
- Sept. 21 Pacific Coast Air Derby from San Francisco to Spokane, Wash.
- Sept. 21 First aerial tour conducted in this country by Thomas Cook & Son, takes off from Curtiss Field for Chicago, for the Dempsey-Tunney fight. A Fokker monoplane with Wright "Whirlwind" motor is used.
- Sept. 23-24 National Air Races, Spokane, Wash.
- Sept. 25 Schneider Cup Race, held at Venice, is won by Lieut. S. W. Webster of the British team, flying a Supermarine-Napier monoplane at an average speed of 281.488 m.p.h.
- Sept. 29 Distinguished Flying Cross is presented to Lieutenants Maitland and Hegenberger for their successful trans-Pacific flight.
- Oct. 1-10 Lieut. A. Koppén of the Dutch Air Mail Service flies from Amsterdam to Batavia, 8,750 miles in 75½ hours flying time, in a Fokker with three Armstrong-Siddely engines, inaugurating a monthly air mail service between Holland and the Dutch East Indies.
- Oct. 4 Junkers G-24 seaplane takes off from Norderney on an attempted flight to New York by way of Lisbon and the Azores, carrying three pilots and a passenger. The flight is later abandoned.
- Oct. 5 Aeronautical Chamber of Commerce holds its sixth annual meeting with election of officers and governors.
- Oct. 8 Miniature aircraft tournament, Memphis, Tenn.
- Oct. 10 Continental Air Lines of Cleveland, Ohio, is awarded the contract for the mail route between Cleveland and Louisville, via Akron, Columbus, Dayton, and Cincinnati.
- Oct. 10-11 George Haldeman, pilot, and Ruth Elder take off from Roosevelt Field on an attempted flight to Paris, but are forced down by engine trouble 325 miles northeast of the Azores. The flight established an over-water distance record of 2,623 statute miles.
- Oct. 10-20 Lieutenants Costes and LeBrix fly from Le Bourget across the South Atlantic to Buenos Aires, using a Breguet XIX, Hispano-Suiza engine. Stops were made at St. Louis, Senegal, Natal, Coravellas, Rio de Janeiro, and Pelotas.
- Oct. 12 Dedication of Wright Field, Dayton, Ohio, by the Air Corps.
- Oct. 12 Curtiss Pursuit Plane Race for the John L. Mitchell Trophy, Dayton, Ohio, is won by Lieut. I. A. Woodring, Air Corps, at an average speed of 158.968 m.p.h.
- Oct. 13 A. Jesek (Czecho-Slovakia), flying a Letov S-16, Hispano-Suiza motor, sets a new speed record for 500 km. for planes with a useful load of 1,000 kg., making 143.492 m.p.h.
- Oct. 15 Capt. W. N. Lancaster and Mrs. Keith Miller start their flight to Australia in an Avro "Avian."
- Oct. 16 Death of Charles M. Manly, pioneer in the development of aviation.
- Oct. 17 R. A. F. two-year service flight to the East and Australia begins, using four Supermarine Southampton flying boats, Napier engines.
- Oct. 18-20 Annual Aeronautic meeting of the Society of Aeronautic Engineers, New York City.
- Oct. 22 Conference called by Postmaster General New to consider the question of postage rates on parcels sent by air mail, is held in Chicago.

- Oct. 23 Colonel Lindbergh returns to New York, completing his tour of the 48 states in *The Spirit of St. Louis*.
- Oct. 25-28 Thirteenth session of the International Commission for Air Navigation is held at Rome.
- Oct. 27 A meeting under the auspices of the Engineers' Club of Philadelphia, the Aero Club of Pennsylvania, and the Philadelphia Section of the A. S. M. E., is held in Philadelphia to discuss the question of safety in aviation.
- Oct. 28 Opening of mail and passenger service between Key West and Havana by Pan-American Airways.
- Nov. 1 Opening of passenger service between San Diego and Los Angeles by Mad-dux Air Lines.
- Nov. 3 Aeronautical Chamber of Commerce of America gives a dinner at the Biltmore in honor of Sir Philip Sassoon, British Under-Secretary of State for Air.
- Nov. 4 Maj. Mario de Bernardi (Italy) sets a new speed record for seaplanes, flying a Macchi M-52, Fiat 51 motor, at a speed of 297.816 m.p.h.
- Nov. 4 Capt. Hawthorne C. Gray sets an altitude record for all aircraft, reaching a height of 42,470 feet. The feat cost him his life.
- Nov. 6 Lieut. A. J. Williams flies at an unofficial speed of 322.6 m.p.h. in his small Kirkham racing plane, with a 24-cylinder, 1250 h.p. Packard motor, originally designed for the Schneider Cup Race.
- Nov. 13 Third annual air meet in celebration of the finish of the World Flight, held at Clover Field, Santa Monica, Calif.
- Nov. 14 Special conference of the trans-oceanic flyers is held at Assistant Secretary MacCracken's office at which meteorological conditions on the various flights are discussed, and recommendations made as to weather forecasts.
- Nov. 14 President Coolidge entertains at luncheon the sixteen trans-oceanic flyers.
- Nov. 16 The airplane carrier "Saratoga," the Navy's largest vessel, is commissioned into service.
- Nov. 17 Sir Alan and Lady Cobham with crew start on their 20,000 mile survey flight over Africa, flying a Short Bros. all-metal flying boats, with Rolls-Royce engines.
- Nov. 19 Contract is awarded to Pitcairn Aviation, Inc., for the air mail route from Atlanta to Miami.
- Nov. 28 New York State Conference on aviation is held at Albany.
- Dec. 1-3 Conference of the industry is held at the offices of the Aeronautical Chamber of Commerce of America, preliminary to that called by Assistant Secretary MacCracken.
- Dec. 5-9 Second National Aeronautical Conference is held at the Department of Commerce, Washington, D. C.
- Dec. 9 Committee of commercial airplane manufacturers decide at the meeting in Washington to enlarge and solidify their activities under the Aeronautical Chamber of Commerce.
- Dec. 10 Lieut. Arthur Gavin, U. S. N., is awarded the Herbert Schiff Memorial Trophy for 1927 for his record during the year of 865 flying hours without accident.
- Dec. 10 Congressional Medal of Honor is awarded to Colonel Lindbergh.
- Dec. 13 Maj. Gen. Mason M. Patrick, having reached the age of retirement, is succeeded by Brig. Gen. James E. Fechet as Chief of the Air Corps.
- Dec. 13 Colonel Lindbergh flies non-stop from Washington to Mexico City, a distance of 2,600 miles in 27 hours.
- Dec. 17 Opening of air mail service between Cleveland and Buffalo by Colonial Western Airways; and between Cincinnati and Chicago, by Embry-Riddle Co.
- Dec. 17 Twenty-fourth anniversary of the Wright brothers' first flight, at Kitty Hawk, N. C.
- Dec. 21 Distinguished Flying Cross is presented to the eight Army Air Corps officers who completed the Pan-American flight.
- Dec. 23 Mrs. Frances Grayson, with Oskar Omdal, pilot, Brice Goldsborough, navigator, and Fred Koehler, take off from Roosevelt Field in an attempted flight to Harbor Grace, N. E., from which point Mrs. Grayson planned to fly to Denmark. The plane is lost at sea.
- Dec. 28 Continuing his "good-will flight," Colonel Lindbergh flies from Mexico City to Guatemala City, a distance of 675 miles in 7 hours.
- Dec. 30 Contract for the air mail route between Salt Lake City and Great Falls, Mont., is awarded to Alfred Frank, of Salt Lake City.

THE story of aeronautic progress in 1927 may be summed up in a single word—Achievement.

The heights of this accomplishment in the past year are sketched in Chapter II of the *Aircraft Year Book*. They include the conquest of oceans and of continents by Lindbergh, Chamberlin, Maitland, Hegenberger, Byrd and the long list of courageous avia-

tors who followed their lead, as well as the awakening of the world to the presence of a speedy and effective means of transportation at its command, equipped and organized for service.

The achievements of 1927 are a monument to the vision, courage and labor of the pioneers who helped shape the beginnings of aviation, and in this year of the most outstanding progress in this field, to which they had contributed so signally, two notable pioneers, Dr. Charles W. Walcott and Charles M. Manly, passed to their reward.

Doctor Walcott was one of the great leaders in aeronautics, a man endowed to a marked degree with the rare gifts of vision, determination, and capacity for constructive work.

The aeronautic industry as a body owes much to the memory of Doctor Walcott. It was he who in 1916 first called the airplane and engine manufacturers into conference and got them acquainted with each other. It was he who stimulated the aircraft industry to make greater preparations for America's participation in the war. It was he who suggested the first continuous production program and who made possible, in fact, the quantity production of aircraft during the war. Through the medium of the cross-license agreement he brought peace to a struggling infant industry that at the time was threatened on all sides with patent litigation. Of Doctor Walcott's constructive work in this connection, the National Advisory Committee for Aeronautics says in its Thirteenth Annual Report:

"The progress of the war in Europe forced a realization of the increasing importance of aircraft in warfare, and in the fall of 1916 the Army and Navy began to expand their air organizations. This movement was only well started when in December, 1916, a patent war loomed in the American aircraft industry. The Wright-Martin Aircraft Corporation, holder of the basic Wright patents, served notice on the other aircraft manufacturers that they must take out



CHARLES D. WALCOTT, 1850-1927.
Late Secretary Smithsonian Institution
and Chairman National Advisory
Committee for Aeronautics.

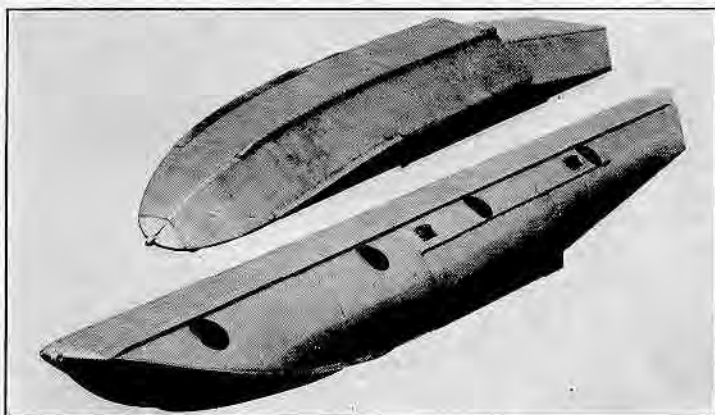
licenses and pay royalties for the right to manufacture aircraft. The Curtiss Aeroplane & Motor Co. (Inc.), which held a number of important patents, including basic seaplane patents, then served similar notice on the other members of the industry. The results were that the cost of aircraft to the Government advanced rapidly and to such an extent as to prevent the procurement of the number of airplanes desired by the Army and Navy within the limits of funds available; and the manufacturers who received orders in quantities which called for expansion of facilities were embarrassed by the pending or threatened patent litigation and were unable to obtain the necessary funds with which to expand, so that the Government, although contracting to pay higher prices, was not able to obtain deliveries of aircraft. In this state of affairs the War and Navy Departments officially called upon Doctor Walcott to have the Advisory Committee study the problem with a view to working out a solution. Doctor Walcott called several conferences with representatives of the various factions in the aircraft industry, and later appointed a sub-committee on patents of the National Advisory Committee. The result was the evolution of a "cross-license agreement" among the manufacturers, which put an end to the patent war and made it possible for the manufacturers to obtain capital to finance their expansion projects. Volumes have been written in criticism and in defense of the cross-license agreement in the aircraft industry. It has everywhere been upheld, first by the Attorney General, then by the courts, and lastly by the Comptroller General. Since its inception there has been no further patent warfare in the aircraft industry."

It was Doctor Walcott's genius for organization and leadership that brought together that patriotic body of men that composed the National Advisory Committee for Aeronautics, who gave and still give generously of their time and of their talents without compensation for the scientific study of the fundamental problems of flight. He was its founder and up to the time of his death, Feb. 6, 1927, he was the chairman of the committee.

Dr. Walcott was an inspiring leader of men with a vision of the future, and, although aeronautics was but one of his many lines of activity, he left an indelible impression upon it even as he did in his own chosen field of geology.

The other pioneer in aviation who passed away in 1927 was Charles Matthews Manly, one of the very earliest of the pioneers. He was the chief assistant of Dr. Samuel P. Langley, and when the actual test of launching the Langley airplane came in 1903, he undertook to pilot it.

Mr. Manly was born at Staunton, Va., in 1876. He was a mechanical engineer and mathematician of high attainment. After completing his course at Cornell he received the degree of Master of Mechanical Engineering. He then joined Doctor Langley in his experiments. At the beginning of his engagement with Doctor Langley, he was not particularly interested in the problem of flying, but he became so imbued with Langley's enthusiasm that he not only built the test plane, but insisted on taking the pilot seat, intended for a dummy, when the plane should be launched in the air by a catapult. He made two flight tests, each ending in a plunge in the Potomac river, the last one nearly costing his life.



All Metal Pontoons. Hamilton Aero Manufacturing Corporation.

Mr. Manly's "Langley Memoir on Mechanical Flight" was published in the "Contributions to Knowledge" of the Smithsonian Institution. He secured about fifty patents in his special fields of engineering.

During the World War Mr. Manly was consulting engineer of the Aviation Section of the British War Office; also consultant and chief inspection engineer of the Curtiss Aeroplane and Motor Corporation, which he served in 1919-20 as assistant general manager. In 1918 he went to London as a member of the International Aircraft Standards Board, and continued his work as consulting engineer in New York City until his end.



Thomas-Morse "Corps Observation" 6-B. Engine, Pratt & Whitney "Wasp."

CHAPTER X

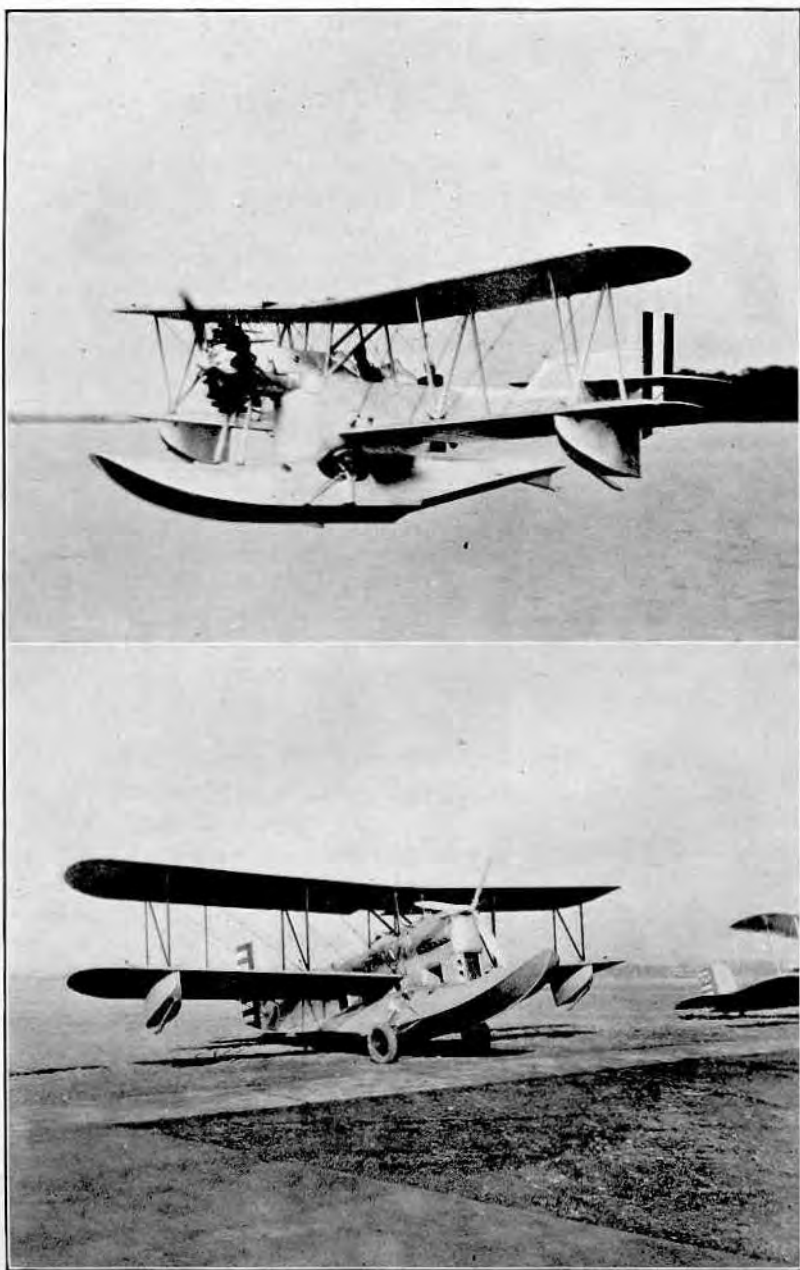
TECHNICAL DEVELOPMENT

THE keynote in technical developments in aeronautics during 1927 has been steady engineering progress. As in 1926, there have been few spectacular developments, but there has been substantially gratifying advancements in all phases of the art. Not only have the performance characteristics of all types of aircraft been improved to a marked degree, but reliability, serviceability and comfort have been given intensive study with the result that much progress is noted in these important characteristics. Advance engine design is reflected in lower weight per horsepower, smaller frontal area per horsepower, and substantially increased life and reliability. Constant research and experimentation has greatly increased the variety of materials available and has improved the suitability of these materials for aircraft use. Aircraft accessories of all types were refined and improved and many new devices were developed which contributed toward improved performance, reliability and safety of aircraft.

General Notes on Airplane Design

Practically all aircraft manufactured during the year were of conventional orthodox types. The conventional tractor biplane type was followed in the design of practically all military aircraft and small sport commercial machines; while monoplanes, either full cantilever or semi-cantilever type, were tending to displace biplanes in the medium and large sizes of commercial planes. Single-engined planes continued to be produced in the majority, though for large commercial and military types there has been a natural trend toward multi-engined planes. Landing gears for aeroplanes were of the usual wheel and tail skid type but incorporated many refinements and improvements in detail design including the use of Oleo types of shock absorbers and the almost universal adoption of wheel brakes. For seaplanes the usual type of single or twin float landing gear was employed and for large size boats, conventional design of hulls. A new tendency was the trend toward development of amphibian types for both military and commercial uses.

With reference to materials, the tendency toward the use of metals noted in 1926 was even more marked in 1927. The use of wood fuselage construction has practically disappeared. Recent



(Top) Loening Navy, Amphibian. Engine, Pratt & Whitney "Wasp."
(Bottom) Loening Army Amphibian. Engine, "Liberty" Inverted.

experiments with metal wing and control surfaces have been very interesting and much further development in this direction is expected. Fuselage and tail structures, landing gear struts, interplane and tail bracing, as well as seats, pedals, control sticks, flooring and other furnishings and equipment are now almost entirely made of metal. In wing structures wood is still used to a large extent, but a number of experimental metal structures have been built which seem to offer great promise. The metals used in the structure members are usually alloy steels or duralumin. The use of the latter increasing to a marked degree, and there are several standard types of planes in production in which duralumin is used for the major percentage of structural members.

The tendency toward the use of metal was particularly evident in the construction of pontoons, floats and boat hulls, where wooden framing covered with mahogany planking have long been the favorite. In 1927 the greater proportion of floats and hulls were covered with sheet duralumin or similar alloys and many had metal framework. The successful use of metal in such cases has been made possible through the development of satisfactory processes and treatments for prevention of corrosion. Another type of covering for floats and pontoons is known as rubber planking and has been used with considerable success on some types.

For the covering of other parts, *i. e.*, wings, tail surfaces and fuselages, fabric is still almost universally used, although some important manufacturers are using sheet metal or veneer, and there have been some experiments with composition wood and sheet metal coverings on fuselages and hulls.

Military Airplanes

The development of military aircraft during the year has been especially gratifying. Both services have standardized on the number of types of service machines, and in most of these classes have procured aircraft that are superior in performance, serviceability and reliability to those of other countries.

The Army classifies its aircraft under six headings, namely, Pursuit, Observation, Attack, Bombardment, Training and Cargo. During the past year satisfactory service types have been produced in five of these classes, and in the other, Bombardment, experimental planes of splendid promise were procured.

Pursuit: Two types of service pursuit planes were procured, the Boeing PW-9 series and the Curtiss "Hawk" series. Both are single seat biplanes, powered with Curtiss D-12 motor. These types have been developed through several years of service to a point where they



(Top) Curtiss Navy "Seahawk." Engine, Pratt & Whitney "Wasp." (Center) Curtiss P-5 "Hawk" Pursuit. Engine, Curtiss Supercharged, D-12 F. (Bottom) Curtiss Airplane Type AT-5. Engine, "Whirlwind."

are superior to service pursuit types of all other countries. In addition to the standard service machine, a super-charged version of the "Hawk" was procured for service tests, and experimental installation of "Wasp" air-cooled engines in the "Hawk" type were made.

Observation: Marked progress is evident in the performance characteristics of observation aircraft. The Curtiss "Falcon," possessing much improved performance over previous types, was procured in quantities with both the Curtiss D-12 and the Liberty motor, and an experimental version with the "Wasp" air-cooled engine also indicated further progress. The Douglas O-2 type following certain design changes developed improved flying characteristics. For service over both land and water, particularly in the Insular Possessions and Coast Stations, the Loening Amphibian has been found very



Fokker Twin Army Bomber. Engine, Pratt & Whitney "Hornet."

suitable and adopted as standard. Experimental development including testing of the Thomas-Morse O-6 plane, which is an all-metal version of the Douglas O-2.

Attack: Much study was devoted to the problem of obtaining a satisfactory attack plane in place of the makeshift versions which had been produced by mounting fixed guns on the wings of the standard DH and O-2 Observation types. After careful investigation, the Curtiss "Falcon" because of its exceptional maneuverability and performance, was selected for modification to an attack type, and a quantity of A-3 Falcons, with fixed guns and bomb racks built into the lower wings, were procured. A Douglas O-2 was also modified for attack purposes by installing bomb racks, wing machine guns, and an air-cooled Liberty engine.

Bombardment: This class received more attention and study from the Air Corps than any other, because of the fact that the standard

service type was obsolete and the number of machines of this type in service was rapidly diminishing. A limited number of single-engined Keystone LB-1 bombers were produced for service tests but were not adopted because of a change of policy opposed to a single-engined machine for bombardment service. The Air Corps later instituted a competition for twin-engined bombing planes, in which Consolidated, Atlantic, Curtiss, Keystone and Sikorsky participated. All of these manufacturers submitted experimental planes, and though awards have not yet been made, Air Corps officials have stated that as



Douglas O-2H Observation. Engine, "Liberty."

a result of this competition the service will soon be equipped with bombing planes that have no superiors in the world. Meanwhile, a small quantity of twin-engined Keystone LB-5's were procured for service use until the new type is available.

Training: Satisfactory types are now available for both primary and advanced training. For primary training, the Consolidated PT-1 with the Wright E engine is being used, but due to the exhaustion of this type of power plant, another version of the PT, with the Wright J-5 engine, is being procured for service tests. For advanced training on pursuit types, the Curtiss "Hawk," with the Wright "Whirlwind" engine substituted for the D-12, has proven highly satisfactory.



(Top) Keystone "Panther" XLB-6. Engines, Wright "Cyclone." (Bottom) Keystone Heavy Bombardment "Super-Cyclops" XB-1. Engines, Packards 2A-1500.

Cargo: The single-engined Douglas Transport, in service tests, has been found satisfactory, but due to the increased reliability of the multi-motored planes, a quantity of Wright "Trimotor Atlantic" C-2A Cargo planes were procured for service by the Air Corps.

The Navy classes its aircraft under five headings: Fighting, Observation, Torpedo, Bombing, Scouting, Patrol and Training. By the end of 1927 the Navy had secured in all these classes, highly satisfactory aircraft possessing improved performance, reliability and



Consolidated-Sikorsky "Guardian" Army Bomber. Engines, Pratt & Whitney "Hornet."

safety over former types. A feature of the 1927 program was the adoption by the Navy of a definite policy using air-cooled engines in Naval aircraft.

Fighter: In this class two new types were secured through a competition, the Boeing "Fighter" and the Curtiss "Sea Hawk." Both of these types with Pratt & Whitney "Wasp" motors, are convertible land or seaplanes, equipped for operating from the carrier decks or of being catapulted. Excellent performance and maneuverability is characteristic of these types, which are both being purchased in quantities.



(Top) Curtiss "Condor" Bomber XB-2. (Bottom) Gunner's Cockpit in "Condor." Engines, Curtiss V-1550.

Observation: The Navy procured three types of planes in this class during the year; the Vought "Corsair," with the Pratt & Whitney "Wasp" motor, has exceptional performance characteristics, as is attested by the fact that it established four world's records during the year. The Curtiss "Falcon," another high-performance observation plane which was adapted from an Army type by the installation of the Pratt & Whitney "Wasp" motor. An improved version of the Loening Amphibian was also successfully developed around the "Wasp" motor for observation work.

Torpedo-Bombing-Scouting: Developments in the three-purpose class include the T-4M, a single-engined Martin plane with the Pratt & Whitney "Hornet" motor has a good performance and has been found particularly suitable for carrier use, this type is being procured



Navy Boeing Shipboard Fighter. Pratt & Whitney "Wasp" engine.

in quantities. Another type, the twin-engined Douglas T-2D, with the Wright "Cyclone" motor, has also proven satisfactory. Three Cargo planes similar to the C-2A designated as the Navy TA-1 were ordered for the use of the Marine Corps Expeditionary Force to Nicaragua, where they are serving in quadruple capacity of bombing, cargo, ambulance and attack.

Patrol: The well-known PN-9 and PN-10 flying boats, with water-cooled engines, have been found highly satisfactory, but in accordance with the new Navy policy, these types are being modified to employ large air-cooled engines either Pratt and Whitney "Hornet" or Wright "Cyclones."



(Top) The Vought "Corsair" Planes used by Asst. Secy. of the Navy Warner, and Admiral Wm. A. Moffett, Chief of Bureau of Aeronautics, Navy Dept. for inspection trips. (Bottom) The Vought "Corsair" Seaplane (all-metal float gear). Both types equipped with "Wasp" engine.

Training: For primary training the Navy has the Consolidated NY, with Wright "Whirlwind" motors, which has been successfully adapted from the Air Corps type. The Navy also held a design competition for a type to fulfill both primary and advance training functions, and Curtiss, winner of the competition, was commissioned to construct a small quantity for service tests.

Commercial Aircraft

Unprecedented activity was evident in the development of commercial aircraft. This was due in large measure to the increased



"Swallow" Biplane. Engine, Curtiss "OX5."

public interest in aviation with the resultant demand for aircraft. While there is still a great deal of experimenting going on, the tendency during the year was toward standardization into a few easily recognized types.

The small two or three-place plane powered with the Curtiss OX motor, for the private owner is still being produced in quantities. This type of machine is usually an open cockpit biplane, possessing a relatively low performance but also low in price and practical for many operators.

In medium-sized planes for mail, express and passenger service, progress was especially rapid, with a large number of responsible manufacturers concentrating on the development of this type. Enclosed cabins with comfortably upholstered seats were almost universally employed, considerable attention was paid to special finishes, trimmings and other factors tending to improve appearance, and almost all planes of this type were equipped with wheel brakes, electric or inertia starters, electric lights, non-recoil landing gear struts and other accessories and improvements. These developments are



"Cessna" Cabin Monoplane. Engine, Wright "Whirlwind."

significant and indicate that the public is beginning to require style, comfort, and convenience, as well as speed and safety, in aerial transportation. Many planes in this class were monoplanes and nearly all were powered with the well-known Wright "Whirlwind" J-4 and J-5 engine.

The number of large commercial aircraft produced during the year, was considerably increased over the preceding year. For passenger transportation, several large cabin planes were built by Atlantic, Keystone, Sikorsky and Ford, luxuriously equipped to carry



Martin Navy Bomber. Engine, Pratt & Whitney "Hornet."



Douglas Navy Three-purpose T2D-1. Engines, Wright "Cyclone."

from ten to twenty passengers and baggage, and fitted with every known device to increase comfort and safety. Most of these were trimotored, powered with air-cooled motors of 200 h.p., although there were a few single-engined types built. Multi-motored predominated in this class and one small 6-passenger all-metal 3-engine cabin monoplane by Prudden. There were also a number of single-engined combined mail and passenger types built by Travel Air, Advance, Swallow, Laird, Alexander, Cessna, Stearman, Lockheed, Stinson and Buhl, Mahoney, Pitcairn and Boeing. Due to the fairly large loads which these planes are carrying, the tendency is toward the power plant of the type of Pratt & Whitney "Wasp," Fairchild "Caminez," Wright "Whirlwind" or other high-powered air-cooled engine. In addition to these types, several planes intended for long distance or endurance flights, were produced. In general, however, these were modifications of the passenger or mail and passenger types, with extra fuel and oil tanks replacing the mail or passenger accommodations and in some cases using larger wings and tail surfaces.

A significant tendency during the year was the revival of manufacturing interest in flying-boat and amphibian types. At least one manufacturer is concentrating his entire attention on small commercial amphibians, and Loening has now brought out his amphibian in cabin form for commercial, civil, and private use, thus making available a new commercial machine that has actually had over 2,000,000 miles of service flying. Several other companies are producing small and medium flying boats and amphibians. Undoubtedly these types will prove increasingly popular with commercial operators.

The light-plane class is receiving little attention from manufacturers, as it seems that for the present, developments in this class will be confined largely to the activities and ideas of individual enthusiasts.

Airplane Engines

In the development of engines for military aircraft, there continues to be two schools of design, air-cooled and water-cooled, and marked advancement is apparent in both classes. Undoubtedly, however, the present tendency is toward concentration on development of air-cooled types. The Navy, which for some time has been fostering this development, announced in 1927 a definite policy of utilizing only air-cooled engines in all new Naval aircraft, while the Army, although the bulk of its planes continues to be produced with water-cooled engines, displayed a marked tendency toward the procurement of air-cooled types for service tests.



Hamilton Metalplane as Land and Seaplane. Engine, Wright "Whirlwind."

There are several types of air-cooled engines now in production whose development has progressed to the point where they are definitely out of the experimental class and are being used in quantities in service aircraft. The well-known Wright "Whirlwind" of 225 H.P., whose worth was so spectacularly demonstrated in many long distance flights in 1927, is being used almost exclusively by both services in primary and advanced training planes, and to some extent in multi-engined transports. The Pratt & Whitney "Wasp" which has been refined until it is now rated at 450 H.P., has been adopted as the standard power-plant for all naval fighting and observation types, and is also being installed experimentally in some Army aircraft. In the 500 H.P. class, both the Pratt and Whitney "Hornet" and the Wright "Cyclone" are in production and are being installed in the larger types of aircraft with complete success. All of the above engines, which are of the radial type, have shown excellent performances in service aircraft, and have definitely established their ruggedness and dependability in actual service.

With a view to reducing the large head-resistance which is inherent in the design of radial engines, considerable experimental work has been done on the production of air-cooled engines not of the radial type. One of the most interesting of these developments is the new Curtiss "Hexagon," a 12-cylinder, 600 H.P. engine, with two banks of six cylinders each, an arrangement which materially reduces frontal area as compared to radial engines. "Vee" type air-cooled engines, adapted from conventional water-cooled types, were also produced, and showed satisfactory performance.

The development of water-cooled engines, already perfected to a high degree, was by no means neglected in 1927. There were many outstanding accomplishments credited to engines of this type, particularly higher powered water-cooled engines, which previously had been more fully developed than air-cooled types. Curtiss, long known for the production of high-grade motors, put in production the V-1550, a 12-cylinder "Vee" type motor, normally rated at 600 H.P. and which, installed in army pursuit and observation aircraft, put up performances that have been unequalled by any other power plant. The same engine was also produced as a geared type and successfully installed in a large, high-performance bombing plane. In addition, of course, the well-known Curtiss D-12 continues to be the standard Air Corps engine for pursuit and observation planes, and has been adopted for use with superchargers. Packard continued to produce with marked success its 600 and 800 H.P. types, mainly for the Navy, and in addition, produced an extremely interesting experimental engine having 24 cylinders, twelve being arranged as in a conventional "Vee"



Ireland Aircraft, Inc. "Neptune" Amphibian. Engine, "Whirlwind."

engine and twelve as in an inverted "Vee" type. This is the most powerful aircraft engine yet built, the first one produced having developed more than 1,200 H.P., while a second engine has been adopted for use with a supercharger, increasing the power to 1,450 H.P.

Another development, which is still in the experimental stage, is that of heavy-oil engines for aircraft. The Allison Engineering Co. in co-operation with the Navy, is working on a heavy-oil burning engine, primarily intended for lighter-than-aircraft, but possibly adaptable for heavier-than-aircraft.



Sikorsky S-37 Commercial. Engines, Gnome Rhone "Jupiter."

In the commercial field, aircraft manufacturers are still handicapped by the limited variety of truly commercial engines available. This does not mean a lack of activity on the part of designers; on the contrary, there has been more attention paid to the development of commercial engines during the past year than ever before. Literally dozens of manufacturers have been working on new engines and there are several types, covering a wide power range, which show promise of developing into satisfactory types. Due, however, to the length of time required to produce satisfactory engines, few of these are now in the production stage.

Of the types already in production, the Wright "Whirlwind" of 225 H. P. has become so well known that it needs little description. This engine, which was used by Lindbergh, Byrd, Chamberlin, Maitland, and others, is almost universally used on medium-powered commercial aircraft in this country. The Fairchild-Caminez engine, which embodies several novel principles of operation, is now in production and is being used in increasing quantities by aircraft manufacturers. For larger aircraft, the Pratt & Whitney "Wasp" has



Lockheed "Vega" Cabin Monoplane. Wright "Whirlwind" engine.

been found eminently satisfactory. All of the above types, as well as most of those now under development, are air-cooled, and undoubtedly this type will predominate in the commercial field.

Accessories

With the activity and development that has been occurring in aircraft and engine design, it follows that there has been a corresponding amount of development in aircraft accessories of all kinds.

Both the Army and Navy have done a vast amount of work in



Sikorsky Amphibian Type S-36. Engines, "Whirlwind."

the development of purely military accessories, including bomb sights, fixed and flexible gun installations, torpedo release mechanism, bomb racks, deck arresting gear, catapults, etc. Most of these developments are necessarily of a confidential nature, and it can only be said that progress is highly satisfactory.

Developments in other accessories have been so numerous as to preclude detailed recitation here. One outstanding feature of the past year has been the satisfactory development and almost universal adoption of wheel brakes, starters, improved landing gears and other



"Prudden" All Metal Tri-motor Monoplane. Engine, "Ryan Siemens."

devices tending to increase comfort and safety of operation. Instruments and navigational aids, particularly airport and airway lighting equipment, have been greatly improved; much work has been done on the refinement of parachutes, life rafts and other life-saving devices; the difficulties of radio communication have received intensive study, with particular attention being paid to the radio beacon which has already demonstrated its value in actual use, and carburetors, self starters, magnetos, superchargers and other power-plant accessories have shown consistent development and improvement.



(Top) Consolidated PT-3. Engine, Wright "Whirlwind." (Bottom) Consolidated Courier. Engine, Wright "Whirlwind."

CHAPTER XI

THE AERONAUTICAL INDUSTRY

AVIATION in 1927 was the recipient of world-wide interest and attention. This interest was followed by a demand for aircraft for commercial and personal use and manufacturers who not so long ago were hanging on grimly and hoping for a real market for their products, suddenly found that the demand far exceeded the supply. This has resulted in an increase of production facilities by many recognized concerns and has stimulated an active period of design and development with new models appearing rapidly. The outlook for the commercial aircraft industry, which had already been stimulated and materially assisted by the new Aeronautics Branch of the Department of Commerce, is therefore more encouraging than at any time past. The only adverse condition appears to be the possibility of over-production due to the attraction of much outside capital and inexperienced management into this new field.

The manufacturers of military aircraft and engines were not affected to any great extent by the sudden public interest in commercial aviation. As a rule, they were already in a sound and healthy condition due to the intelligent administration of the procurement policies of the Air Services under the Five Year Program Acts. Most Government contractors reported a satisfactory volume of business for 1927 and for them the year was one of steady progress in the refinement and production of standard types and in the development of new service designs.

Manufacturers of accessories and equipment and supplies including propellers, power plant accessories, instruments and navigational aids, life saving equipment, as well as raw materials, were decidedly active and the quantity of high grade materials was greatly increased.

Names and addresses of manufacturers and officials of the various companies will be found in the Trade Index in this volume.

Airplanes

Advance Aircraft Company of Troy, Ohio, one of the pioneer manufacturers of commercial airplanes, continued to develop and manufacture on a large scale the well known "Waco." This is a three-place open-cockpit commercial airplane, powered with the Curtiss OX-5 engine. This plane was extensively used by private owners in the United States. The "Waco" was also produced with



(Top) Waco "Ten" Biplane. Engine, "Whirlwind." (Bottom) Waco "Ten" Biplane. Engine, "Siemen-Halske" 7 Cylinder.

several types of motor installations, and plans are being perfected for production of high powered planes during the current year.

The Aerial Service Corporation of Hammondsport, N. Y., has continued its production of planes designed for various commercial uses and a combination wheel and ski type of landing gear in addition to its other activities.

Alexander Aircraft Company, of Denver, Colo., one of the larger producers of commercial aircraft in the country, continued in 1927 to produce the "Eaglerock," a three-seater, open-cockpit biplane, powered with the Curtiss OX-5 engine. Another version of the "Eaglerock," especially designed for the Wright "Whirlwind" motor, 200 H. P., was also produced.

This company also had under development in 1927 a new small commercial machine and an eight-place transport airplane.



The Alexander Aircraft Company Spring Safety Stick designed to prevent accidents in training due to a student "freezing" to the controls.

The Alexander Company is also responsible for the development of the spring safety stick, designed to prevent accidents in training due to a student "freezing" the controls.

It is interesting to note that the Alexander Company was the first to institute a deferred payment plan on aircraft, following in general the methods successfully used in the marketing of automobiles.

American Eagle Aircraft Corporation, of Kansas City, Mo., produced during the year the American Eagle, a small biplane of the familiar three-place, open cockpit type, and powered with the Curtiss OX-5 motor.

Atlantic Aircraft Corporation, of Hasbrouck Heights, N. J., manufacturers of the well-known Fokker aircraft, continued the production of the Fokker "Universal," a four to six-passenger mono-

plane, powered with the Wright "Whirlwind" motor, and the "Tri-motor," a large three-engined cabin monoplane for commercial use. One of the latter, powered with three Wright "Whirlwind" engines,

was used by Commander Byrd for his flight from New York to France. Another Fokker monoplane, powered with a single 450 H. P. "Jupiter" air-cooled engine, was built for the attempted trans-Atlantic flight of Bertaud and Hill.

Two new types of commercial planes, the "Super-Universal," a cabin monoplane, powered with Pratt & Whitney "Wasp" engine and seating six passengers and two pilots, and the F-10 monoplane, powered with three "Wasp" engines and seating 12 passengers, with two pilots, were placed in production during the year. All of the above types have a thick internally braced, veneer covered wing, which is characteristic of Fokker design.

The Atlantic Company also entered the military field with two new types. The XLB-2 is a light bombardment plane, which was



American Eagle.

entered in the Air Corps competition at Wright Field. It is a twin-engined monoplane in which the usual Fokker veneer wing has been replaced by a fabric covered wing. The XLB-2 was originally powered with two 425 H. P. Pratt & Whitney "Wasp" engines. These were later replaced by Pratt & Whitney "Hornet" air-cooled engines of 525 H. P.

C-2A cargo transport type was developed for the Army and the Navy. A plane of this type was used by Maitland and Hegenberger in their flight to Hawaii. The C-2A is powered with three Wright "Whirlwind" engines.

The TA1, a four-purpose Wright "Tri-motor" monoplane, was also developed for the use of the Marine Corps as previously noted in the technical chapter.

The Bellanca Airplane Company, of Staten Island, N. Y., started late in 1927 to manufacture the Model J, a closed cabin monoplane, accommodating four or five passengers in addition to a pilot, powered with a Wright "Whirlwind" engine. It has an externally braced wing with a welded steel tubular fuselage.

Boeing Airplane Company, of Seattle, Wash., one of the largest manufacturers of aircraft in the United States, carried out an extensive program in the building of experimental and production types of aircraft for both military and commercial use.

For the Army the well-known PW-9 series of Pursuit Planes, powered with the Curtiss D-12 motor, was refined and continued in extensive production. The latest modification is the PW-9, incorporating many improvements over previous types, including wheel brakes.

Model 66, a high performance single-seater Pursuit, built around the Packard 2A-1500 inverted engine, was also provided for the Army Air Corps.

For the Navy, Boeing built a production order of the FB-5. This is a carrier fighter version of the PW-9, powered with the Packard 2A-1500 engine and convertible as a land or seaplane.

Another single-seater Boeing fighter produced for the Navy was the F2B, powered with the Pratt & Whitney "Wasp" air-cooled engine. It is equipped as a carrier-fighter, provided with emergency flotation gear, and mounts a new type of armament installation.

The F3B, a shipboard fighting plane, developed for the Navy competition in 1927, is now being produced in quantities. This plane is a development from the F2B, is equipped for catapulting either as a land or seaplane and is fitted with arresting gear for deck landing. The power plant is a Pratt & Whitney "Wasp" engine.

Boeing also entered the commercial field in 1927, producing Model 40-A, a cabin mail and passenger plane, powered with a Pratt & Whitney "Wasp" engine. Twenty-four Boeing planes, equipped with Pratt & Whitney "Wasp" 410 H. P. radial air-cooled engines are being used on the Chicago-San Francisco mail route. Modifications of this type with Pratt & Whitney "Hornet" engines and greater passenger capacity are under development.

Construction was also begun on Model 80, a tri-motored night mail plane seating 12 passengers and luxuriously equipped with every convenience for comfort. It is powered with three "Wasp" engines.

Other types of commercial planes under development by Boeing include the B-1 flying boat, seating three passengers in an enclosed cabin, and Model 81, a two-place, open-cockpit biplane, powered with a Fairchild "Caminez" engine.



Russell "Lobe" Parachute.

Buhl Aircraft Company, of Marysville, Mich., continued to produce the "Airster," a three-place, open-cockpit commercial biplane, powered with a Wright "Whirlwind" engine. Buhl also produced the "Air Sedan," a five-place closed cabin biplane, also powered with the Wright "Whirlwind" engine and intended for commercial use.

The Central States Aero Company of Davenport, Iowa, built an interesting small monoplane, the "Monocoupe," a closed cabin type, having side by side seating accommodations for one passenger and a pilot. Various power plants have been installed, the latest models being equipped with 60 H. P. Anzani air-cooled engine.

Cessna Aircraft Company of Wichita, Kansas, produced during the year the Cessna Cantilever Monoplane, a four-place enclosed cabin type that is equipped to take several different motor installations. Side by side dual control is provided. This machine is also furnished as an open cockpit type.

The Curtiss Aeroplane and Motor Company, of Garden City and Buffalo, N. Y. This organization continued its widespread aeronautical activities both in the refinement and production of existing types of military aircraft and experimental development of new types for military purposes.

The two-seater Curtiss "Falcon" has evolved, like the Curtiss "Hawk" pursuit plane, into a series of two-seater types, each adapted for some special military purpose. This has been made possible through the use in the "Falcon" of a detachable type of engine mount, such as is now standard on all modern Curtiss aircraft.

The O-1B "Falcon," which has been adopted as the standard two-place observation plane of the Army Air Corps, was produced in quantities. It is a single-bay biplane with a tubular duralumin fuselage and is powered with the Curtiss D-12 motor of 435 H. P. The O-1B during the year was also produced as a single float seaplane, having a performance nearly equal to the standard land-plane machines.

The O-11 "Falcon" is an observation type similar to the O-1B, powered with the 400 H. P. Liberty motor and used by the Army and National Guard.

The A-3 is another modification of the "Falcon," which has been adopted as the standard attack plane of the Air Corps. This plane is equipped with machine guns and bomb racks in the lower wings and is powered with the Curtiss D-12 motor.

For the Navy, Curtiss has produced the "Falcon" both as an observation and an attack plane, with the Pratt & Whitney "Wasp" air-cooled engine substituted for the D-12 motor. Experimental machines of this type have also been delivered to the Air Corps.

The XO-13A "Falcon" is an observation type plane, powered with the 600 H. P. Curtiss V-1550 water-cooled motor and equipped with wing radiators. This machine showed a considerable increase in performance over the lower powered "Falcon" types.

The well-known "Hawk" series of pursuit planes was augmented by four new types built during the year. One was the AT-5, a pursuit training plane, powered with 225 H. P. Wright "Whirlwind" engine.

The XP-6, a "Hawk," with the 600 H. P. Curtiss V-1550 motor substituted for the D-12 motor, was built for the Air Corps and showed a superior performance over the regulation D-12 "Hawk."

The XP6-A, another "Hawk," powered with the V-1550 motor, but having straight wings of thin section in place of the usual tapered Clark "Y" wings and equipped with Curtiss wing radiators, was also built for the Air Corps. This plane claims a higher performance than any pursuit type now in service.

The P-5 "Super-Hawk" is powered with the D-12F Curtiss motor and equipped with the General Electric side type of supercharger, which provides improved performance at the high altitudes, which must be maintained in combat.

For the Navy, Curtiss developed during the year an experimental type of shipboard fighter known as the F7C-1 "Sea Hawk." This machine is powered with the Pratt & Whitney "Wasp" engine; is a convertible land or seaplane, and is adapted for deck landing and catapulting. It is now being produced in quantities.

Perhaps the most interesting new development of the Curtiss Company during the year was the Curtiss "Condor," a large bombing plane developed for the recent Air Corps competition. This machine has an all-metal structure, and is powered with two 600 H. P. geared Curtiss V-1550 motors.

In addition, the Curtiss Company developed designs for the new type of training and attack planes, as well as carrying out an extensive program of pure and applied research on aeronautical problems.

The Consolidated Aircraft Corporation, of Buffalo, N. Y., one of the largest manufacturers of service equipment, produced during 1927 the Consolidated "Courier," a step-up training biplane, powered with the Wright "Whirlwind" engine. This machine is equipped to afford gunnery, photography, and radio training in addition to standard equipment for dual instruction and general cross-country work. It is a convertible land or seaplane.

Consolidated also produced quantities of the well-known NY-2 standard navy primary training airplane and PT-3 standard army primary training airplane.

The work of the Consolidated Aircraft Corporation during 1927 centered around the perfection and the production primarily of military types of aircraft, designed to meet the demands for training and war service.

The Douglas Company, of Santa Monica, Calif., one of the well-known manufacturers of military aircraft, produced last year three new types of airplanes.

The T2D-1 is a three-purpose navy biplane for torpedo carrying, bombing and scouting. It is a convertible land or seaplane and is equipped both for deck landing and catapulting. The original planes of this type were powered with the 500 H. P. Wright P-2 air-cooled engines and later types are equipped with the Wright "Cyclone" engine.

The XA-2 is an experimental ground attack airplane, developed for the Army Air Corps from the O-2 type of observation plane. It is a two-bay biplane with the inverted air-cooled Liberty motor and mounting six fixed guns and two flexible guns.

The O-2H observation plane is a refinement of the well-known O-2 series produced for the Army Air Corps, and powered with a 400 H. P. Liberty motor. Refinement of design in the O-2H has shown improved performance and flying characteristics over the O-2 series.

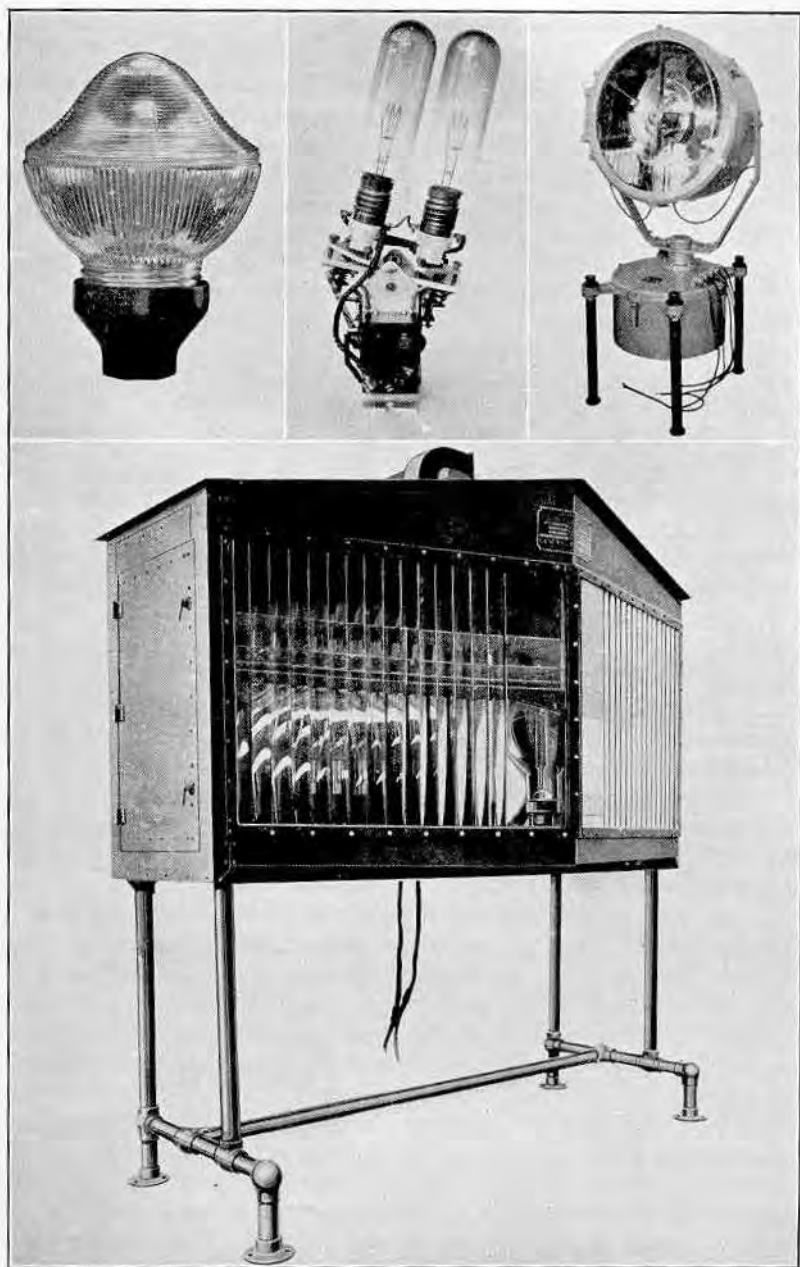
During the year the Douglas Company also developed a design for the XO-4, a training observation plane, powered with the Wright "Whirlwind" motor and this machine is now being built for the United States Army Air Corps.

Eberhart Aeroplane and Motor Company, Inc., of Buffalo, N. Y., in addition to the manufacture of airplane ordnance equipment, airway flares, lights, and ignition equipment, continued the development and production of commercial airplanes for training, cross country and general commercial flying, as well as single sea fighters for the navy.

G. Elias & Bro., of Buffalo, N. Y., continued with the development of the "Aircoupe," a two-place convertible machine for the private owner. Elias also has handled a number of parts, contracts for the Army and Navy.

The company's air express planes embodies many of the good features of the Elias mail plane with increased pay-load and the addition of many new features. The company has been awarded seven prizes for merit of design in Army and Navy competitions.

The Fairchild Aviation Corporation, factories at Farmingdale, Long Island, N. Y., were extremely active in 1927, concentrating on the popular five-seater Fairchild cabin monoplane. This plane,



GENERAL ELECTRIC COMPANY.

(Top Left) Multi Airport Boundary Light for Intermediate Fields. (Top Center) Automatic Lamp Changer. (Top Right) 24-in. Airway Beacon CR-6 Form D. (Bottom) Airport Twin Floodlight.

equipped with the Wright "Whirlwind," is a semi-cantilever monoplane, convertible as a land or seaplane and has been extremely popular with commercial operators throughout the country. This machine also has been built with other power plant and one of the most interesting installations has been that of the Fairchild "Caminez" engine, which was completed late in the year.

In addition to the development of an all-purpose cabin monoplane, the Fairchild Aviation Corporation also have developed and put into production metal airplane pontoons, which have some distinctively novel features. These pontoons are built on framework of wood and metal, with duralumin bulkheads, dividing the floats into watertight compartments.

The Ford Motor Company of Dearborn, Mich., continued extensive research and experimental work and produced quantities of the well-known Ford tri-motor monoplane, one of the few all-metal types in the country. This plane is luxuriously equipped to accommodate ten passengers and pilot, and has shown excellent operating records in actual service. It is normally powered with three Wright "Whirlwind" engines, although some models have been built equipped with one Pratt & Whitney "Wasp" and two Wright "Whirlwinds."

The Ford Company has also been one of the few manufacturers to experiment with very small aircraft and produced a successful small flivver monoplane.

Hall-Aluminum Aircraft Company, of Buffalo, N. Y., has entered upon the construction of all-metal airplanes, and continued the engineering developments of Charles Ward Hall in all-metal military airplanes.

Hamilton Metalplane Company, of Milwaukee, Wis., continued to develop the all-metal type of cabin monoplane, which was first produced in 1926. The "Silver Eagle" is a land plane, powered with the Wright "Whirlwind" motor, and the "Silver Streak" has the Pratt & Whitney "Wasp," having accommodations for from four to eight passengers. The "Silver Swan," with the Wright "Whirlwind," and the "Silver Sea-Dan," with the Pratt & Whitney "Wasp," are an adaption of this machine as a seaplane. Development work was also carried on in the design of metal monoplanes of larger size with air-cooled engine of greater power. A Hamilton Metalplane, piloted by Randolph G. Page, won second place in the Third National Air Tour, with the high score of 7863.5 points.

Huff Airplanes, Inc., of Perth Amboy, N. J., is a new organization in which several men well known in the aeronautical industry are interested. The company is erecting a modern factory and plans

to manufacture military and commercial aircraft in both single engined and multi-engined types.

Ireland Aircraft, Inc., of Garden City, N. Y., recognizing the value and importance of the amphibian, produced in 1927 the "Neptune," an amphibian flying boat of biplane design, having a hull of duralumin over wooden framing. The "Neptune" is powered with the Wright "Whirlwind" engine mounted as a "pusher." The plane has a seating capacity for five persons, and can be supplied with enclosed cabin or open cockpits.

Keystone Aircraft Corporation, of Bristol, Pa., one of the well-known military aircraft manufacturers, is now producing both military and commercial types.

In 1927 this company produced the "Pathfinder," a ten-passenger cabin biplane, powered with three Wright "Whirlwind" engines and equipped to carry a small amount of mail or baggage. The first of these machines is being used for passenger service by the West Indian Aerial Express of Santo Domingo.

The "Pronto," a three-place open cockpit biplane, was also produced by the Keystone Company. This is a convertible land plane or twin-float seaplane, powered with the Wright "Whirlwind" engine. Provision is also made for using the Roots type supercharger on this engine.

The new types of bombing planes were built by the Keystone Company in 1927. The XB-1 "Super-Cyclone" is a twin-engined, heavy bombardment biplane of all-metal structure and powered with two Packard 550 H. P. engines. The LB-6 "Panther" is a smaller type, also all-metal, powered with two Wright "Cyclone" air-cooled engines. Both of these bombardment machines participated in the Air Corps competition for bombing planes at Wright Field.

The LB-5, a twin-engined light bomber, powered with two Liberty motors, was delivered in quantity to the Air Corps for use in service.

Laird Aircraft Corporation, of Wichita, Kan., manufactured the "Whipporwill," a cabin biplane for commercial use, powered with the Wright "Whirlwind" engine and having the cabin especially fitted for the comfort and convenience of the passengers. The standard equipment on the Laird planes includes Standard steel or Hamilton metal propellers, Sauzedde wheels and brakes, complete set of Pioneer instruments except earth inductor compass, lights, starter, windshield wiper, etc.

The Lockheed Airplane Company of Burbank, Calif., began during 1927 to manufacture the "Vega," a unique cabin monoplane, having plywood covered cantilever wings and a monocoque fuselage.



Scintilla Aircraft Magnetos.

This plane seats four to six passengers and pilot and is powered with Wright "Whirlwind" engine.

The Loening Aeronautical Engineering Corporation of New York City, well known as the manufacturers of the Loening amphibian and other types, which have been successfully used by both the Army and the Navy, continued to produce amphibians with inverted Liberty motors, in quantities. The Good-Will Flight of the Air Corps to South America is one of the outstanding accomplishments credited to the Loening amphibian. The development during the past year culminated in the production of the OL-8 amphibian design for the United States Navy and powered with the Pratt & Whitney "Wasp" engine in place of the inverted Liberty motor. The performance of the Loening amphibians in the Pan-American Good-Will Flight was a duplication of the service record of these planes in the extensive aerial survey expedition undertaken by the Navy in Alaska in 1926 with three Loening amphibians. These planes engaged in the mapping of 40,000 square miles of difficult territory and gave a splendid account of themselves under trying flying conditions.

The Loening Company, like several other manufacturers of military planes, have recognized the potential market for commercial machines, and at the close of the year announced that development work was rapidly nearing completion on a cabin amphibian, powered with the "Wasp" engine for commercial use.

B. F. Mahoney Aircraft Corporation, formerly Ryan Airlines of San Diego, manufactured the famous *Spirit of St. Louis* which carried Lindbergh to Paris. The *Spirit of St. Louis* was a special modification of the standard Ryan Brougham built for commercial use. This plane is a five-place cabin monoplane, powered with the Wright "Whirlwind" engine. The Mahoney Company also operates a flying field at San Diego with a complete course of instruction in both ground work and actual flying.

Pitcairn Aviation, Inc., of Bryn Athyn, Pa., produced in 1927 the "Mailwing," a single-seat, high performance biplane, powered with the Wright "Whirlwind" engine and designed for use on night air mail lines. This plane possesses excellent manoeuvrability and speed range and is being used on the air mail lines of Colonial Air Transport and other mail carrying operators. This company has the contract for carrying the mail on the New York to Atlanta route, which will be a night operation. The flying equipment will be all Pitcairn planes. The company's factory now is up to a production of one "Mailwing" plane a week.

Prudden-San Diego Airplane Company of San Diego, Calif.,

built the TM-1, an all-metal commercial monoplane, powered with three Siemens-Halske motors of 125 H. P. The plane is of the enclosed cabin type, equipped to carry seven passengers and baggage, or 1200 pounds of freight, in addition to the pilot.

Sikorsky Manufacturing Corporation, of College Point, Long Island, realizing the value of the amphibious type of plane, built in 1927 a unique machine of this type known as the S-36. It is an enclosed cabin plane with seating accommodations for eight, and characterized by the familiar Sikorsky sesqui-wing arrangement. The structure is all metal with duralumin floats and the plane is powered with two Wright "Whirlwind" engines.

The S-37, a large cabin land plane, powered with two 500 H. P. "Jupiter" air-cooled motors, was built and tested during the year. The structure is all-metal, using typical Sikorsky channel sectional for structural members. This plane was intended for a non-stop New York to Paris flight by Capt. René Fonck and completed its preliminary trials in a satisfactory manner, but Capt. Fonck was obliged to abandon the attempt for the year thru circumstances which had no connection with the performance of the plane.

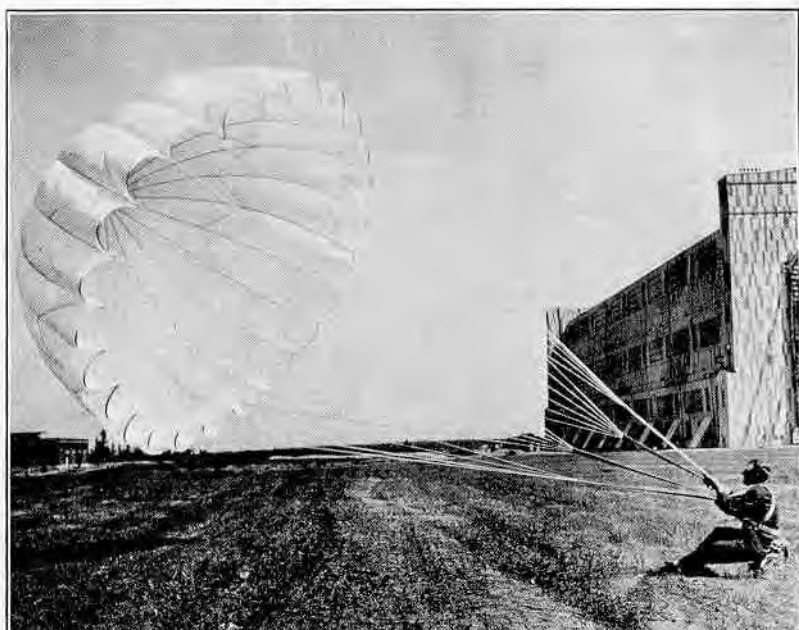
Sikorsky also entered the military field with a heavy bombardment airplane which is essentially a modification of the S-37. It is powered with two 500 H. P. Pratt & Whitney "Hornet" engines, and was successfully flown and delivered to the Air Corps for tests in competition with other bombing planes.

Stearman Aircraft Company of Wichita, Kansas, formerly of Venice, Calif., manufactured a three-place open cockpit model, and a convertible mail and passenger model, all around one basic design, and equipped to be powered with any one of several power engines varying from 90 to 250 H. P. The open cockpit machine with "Whirlwind" engine has been the most popular of these types.

The Swallow Airplane Company of Wichita, Kan., one of the foremost and best known manufacturers of commercial aircraft, produced in large quantities the popular Swallow Biplane. This is a three-place open cockpit biplane, normally powered with Curtiss OX-5 engine. Another version of this type is powered with the Wright "Whirlwind" engine.

The Thomas-Morse Aircraft Corporation, of Ithaca, N. Y., pioneers in aircraft construction, continued to develop all-metal construction aircraft. This company, which for a number of years has carried on important experimentation in all-metal construction, delivered to the United States Army Air Corps several O-6 all-metal observation planes, powered with Liberty motors.

A new experimental model known as 6-B, on which information



Irvin Parachute.

has not been released, was also produced for the Air Corps. The 6-B is powered with a Pratt & Whitney "Wasp" air-cooled engine and is expected to give a most satisfactory performance.

Travel Air Mfg. Company of Wichita, Kansas, well-known manufacturers, continued to produce several types of commercial aircraft. These include three-place open-cockpit biplanes, powered with the 90 H. P. Curtiss OX-5, the 135 H. P. air-cooled Fairchild Caminez, or the 200 H. P. air-cooled Wright "Whirlwind" engine, and the Travel Air monoplane, a cabin plane with capacity for pilot and four passengers or 750 pounds of cargo. This monoplane is powered with the Wright "Whirlwind" engine and was the plane used by Arthur Goebel in his successful flight to Hawaii.

Chance Vought Corporation of Long Island City, one of the established aircraft manufacturers, and long known as an extensive producer specializing in Naval Aircraft, carried out a large production program during the year, concentrating on its new O2U-1 model, the "Corsair," a two-place high performance Observation-Fighting plane designed around the Pratt & Whitney "Wasp" air-cooled engine. It is furnished as a standardized model, quickly convertible for landplane or seaplane use, and in addition is completely equipped for catapulting and deck landing. The "Corsair" has shown outstanding performance, and easily established four recognized World seaplane records—three for speed and one for altitude, all made by Naval Air Service pilots.

The Vought Model FU-1, an altitude fighter, is a single-seat convertible type, equipped with J-5 radial air-cooled engine with special Vought supercharger installation and was also constructed for the Peruvian Navy.

The Vought company also carried on an extensive research program, together with experiments and development work on two new types—a "Corsair" amphibian design, powered with Pratt & Whitney "Wasp," possessing many novel and original features which reached the production stage at the end of the year, and a new Pursuit plane on which the Navy has not yet released information.

Orin Welch Aircraft Company of Anderson, Inc., have taken over the plant and operations of the Anderson Aircraft Company and continued its extensive experimental work on a steel fuselaged biplane equipped with high lift folding wing, and motored with a six-cylinder radial air-cooled engine.

Motors

Allison Engineering Company of Indianapolis, Ind., carried on development and production of the Allison V-1650, an inverted ver-

sion of the Liberty engine, and also continued to develop the inverted air-cooled Liberty engine. In addition, this Company has begun work on a 750 H. P. heavy-oil burning aircraft engine.

The Allison Company has also co-operated with the National Advisory Committee for Aeronautics in the development of Roots type superchargers for aircraft engines and two models of this type of supercharger are now in production.

Curtiss Aeroplane and Motor Company continued to produce at its Buffalo factory its 12-cylinder water-cooled D-12 motor rated at 435 H. P. at 2,300 rpm. This motor is widely used for high performance military aircraft, a modification of the D-12 known as the D-12F and equipped for use with a side type supercharger, was produced for the Air Corps and installed in the Curtiss P-5 "Super-Hawk" type of Pursuit plane.

The V-1550 "Conqueror," a 600 H. P. 12-cylinder water-cooled type of the same basic design was produced both as a direct drive and geared engine and was installed in various types of Air Corps planes.

In 1927 Curtiss entered the air-cooled engine field with the R-1600 "Chieftain" hexagon engine, a 12-cylinder type of unique design. This engine has two banks of six cylinders each arranged one behind the other on a two-throw crank shaft with overhead gear-driven cam shafts. The block tests have shown the hexagon engine to be the most powerful air-cooled engine yet produced in this country, as it develops over 600 H. P. at 2,100 rpm. Due to its unusual construction it has a smaller over-all diameter than radial air-cooled engine of 400 H. P. now in service.

Fairchild Camenez Engine Corporation of Farmingdale, N. Y., as a result of several years' experiment and research, placed in quantity production the four-cylinder Fairchild Camenez Air-Cooled Engine, rated 135 H. P. at 1,000 rpm. and noteworthy because of its unique design in which the pistons are actuated by a double cam instead of the conventional crank shaft connecting rod arrangement.

Development work was also carried out on smaller as well as larger and more powerful engine designs on the Camenez principle.

Packard Motor Car Company of Detroit, Mich., in addition to continuing production of standard types, developed in the last year the most powerful aircraft engine in the world, the Packard X type. This is a 24-cylinder water-cooled engine with twelve cylinders arranged as in a Standard "Vee" engine and twelve as in an inverted "Vee" engine. Two of these engines were built for the United States Navy. One developed 1,260 H. P. at 2,700 rpm.



Sperry High Intensity Flood Lights, San Francisco Airport.



Window Display of Air Associates, Inc., Fifth Avenue and 44th Street,
New York City.

The second was provided with a supercharger which gave it 250 additional H. P.

The Packard company also continued on production orders for the Navy its 600 and 800 H. P. types of 12-cylinder water-cooled "Vee" engines in direct and gear-driven types. The 600 H. P. engine is also produced as an inverted engine.

The Pratt & Whitney Aircraft Company of Hartford, Conn., carried on with the development of its radial air-cooled engines, the successful performance of which have made them so well known and widely used in the United States and other countries.

The "Wasp" 9-cylinder radial engine, originally rated at 410 H. P. at 1,900 rpm. has been developed until the new series is now rated at 450 H. P. at 2,100 rpm. The "Wasp" is the Navy standard engine for single and two-seater fighting planes and was responsible for bringing six World's record to the Navy in the past year. This motor is also being installed in Navy amphibian planes, as well as experimentally in Army Fighting and Observation types. One modification of the "Wasp" has been adapted for use with the General Electric type of supercharger using a 10 to one gear ratio. The "Wasp" has also become available for commercial purposes and is being extensively used in mail and passenger planes by Boeing, Ford, Fokker and others.

The "Hornet," a larger type, rated at 525 H. P. at 1,900 rpm. is now also in quantity production and has been experimentally installed in heavy long distance scouting and bombardment types and is available for commercial use.

Wright Aeronautical Corporation of Paterson, N. J., is the manufacturer of the Wright "Whirlwind" engine which leaped into wide fame as the power plant of Colonel Lindbergh's *Spirit of St. Louis* on his epochal flight to Paris.

The "Whirlwind" is a 200 H. P. radial air-cooled engine that is being extensively used by military services for primary and advanced training. It has also come into wide use in commercial aircraft, particularly during the past year when it became the power plant of probably more aircraft than any other single commercial engine of post-war design. So heavy has been the demand for this type of engine that the Wright production facilities have been considerably expanded during the year.

The 525 H. P. radial air-cooled "Cyclone" was also put into production and delivered to both the Army and Navy.

The latest experimental development of the Wright company is a 12-cylinder air-cooled inverted "Vee" engine designed to develop 600 H. P. at 2,500 rpm. and known as the Wright "Tornado."

Airships and Balloons

During 1927 balloon and airship manufacturers built a number of balloons and kite balloons for the military service.

The Aircraft Development Corporation of Detroit reports steady progress being made on the metalclad airship, which it is building for the Navy, and which it expects to be able to deliver during the latter part of 1928. This company was represented in the Gordon-Bennett International Balloon Race through its superintendent of construction, E. J. Hill, and his assistant, Arthur Schlosser, who won the race in competition with 15 other entries.

Airships, Incorporated, of Hammondsport, N. Y., has carried on with the improvement and production of life-saving devices for



Commander Byrd testing "Aircraft" especially built for his trans-Atlantic flight by Airships, Inc.

aircraft. In 1927 this company developed an improved rubberized fabric for flotation gear and collapsible boats, and manufactured the well-known "Aircraft" in three sizes and in co-operation with the Aud Life Saving Suit Corporation developed a rubberized waterproof suit for aircraft pilots. Airships, Inc., also continued development work on dirigibles of the T. E. training type.

Goodrich Tire & Rubber Company of Akron, Ohio, continued with its development of Goodrich balloon and airship valves and fabrics. They also perfected the production of "Aeroboard," a highly interesting substitute for wood and metal for use in the construction of floats, bulkheads, fuselages, etc. The company devel-

oped a shock absorber disc for landing gears and continued with the refinement and production of aeroplane tires, rubberized fabrics, hose, floor matting and other rubber products.

The Goodyear Tire and Rubber Company of Akron, Ohio, including its subsidiary, the Goodyear-Zeppelin Corporation, was engaged in consistent development, manufacturing and construction programs for the United States Government lighter-than-air branches during 1927.

The Goodyear company won the Navy's Airship Design Competition for a super-dirigible. The winning design was for an airship 780 feet long, 135 feet in diameter, and with a volume of 6,500,000 cubic feet. The airship was designed to be capable of a speed of 80 miles an hour.

This activity included the survey of landing field projects in various parts of the country with reference to the possibility of utility as hangar and airship construction sites, and as operating bases.

In the balloon departments and the aeronautic workshop of the Goodyear company, the personnel was largely engaged on Air Corps and Navy replacement orders, constituting an ordinary volume of business.

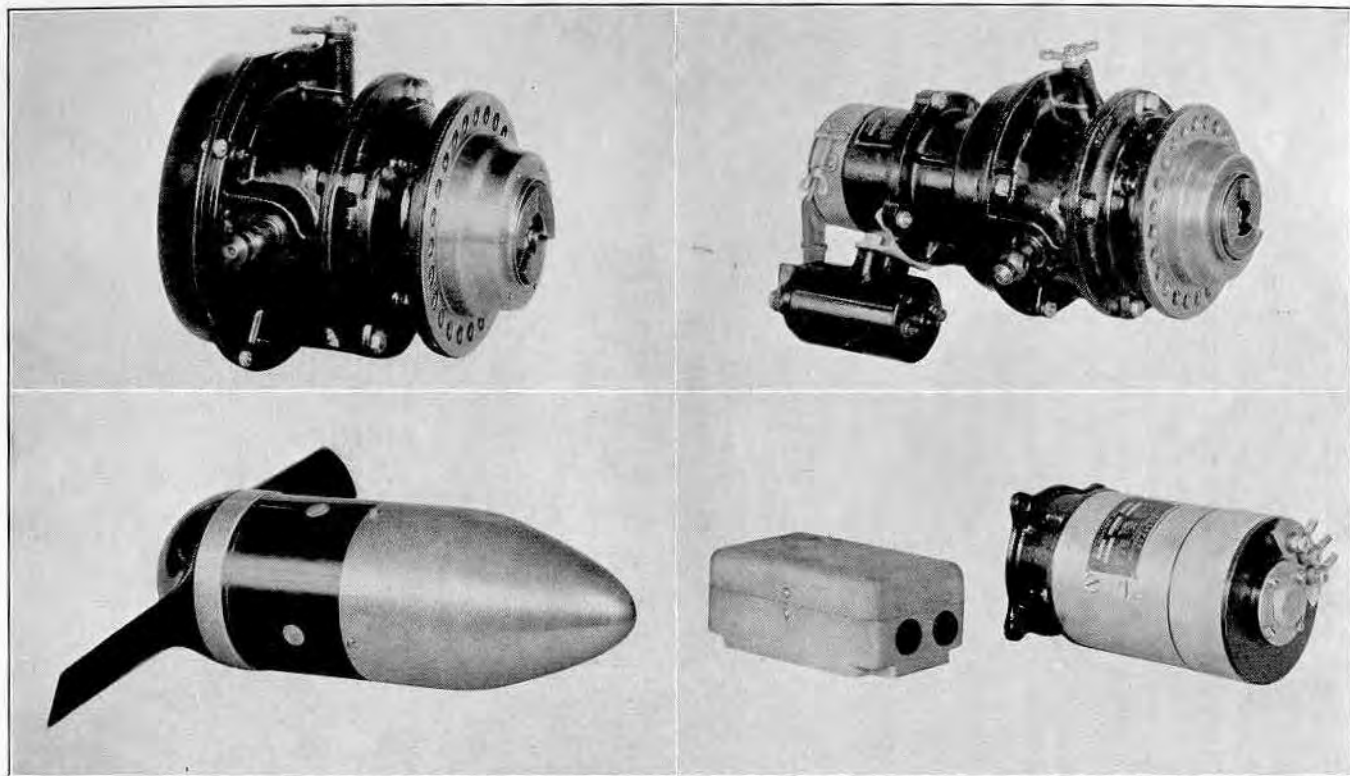
A total of nine "TC" type, non-rigid airship envelopes of standard training ship design were completed and delivered during the past year, five going to Army air stations and four to the United States Navy. The "TC" airship has a gas volume of approximately 200,000 cubic feet.

Two "TA" type training ship envelopes of 130,000 cubic feet capacity were manufactured for the Army, in addition to an all-metal training airship car, and two sets of airship control surfaces.

Six spherical balloons of various sizes, and three 50,000 cubic foot kite balloons were completed, and the company's gold beater skin room reopened for the laying of gas cells for the Navy airship *Los Angeles*.

Two cells were finished during 1927 and five more of the same order will be delivered to the Lakehurst station during the early part of 1928. In addition to this cell contract, eight more gas cells are to be constructed for the Navy on the completion of the first order.

A new nose cone of Goodyear design for the United States Army semi-rigid airship *RS-1* was built during the last year and rigged on the ship at Scott Field, Ill., and work launched on an airplane handling device for the *Los Angeles*, a project to be fully under way this year.



ECLIPSE MACHINE COMPANY.

(Top Left) Hand Inertia Starter, Concentric Type.

(Bottom Left) Voltage Regulated Generator, Propeller Driven.

(Top Right) Combination Hand and Electric Starter.

(Bottom Right) 15 Ampere Voltage Regulated Generator with Control Box.

The Goodyear-owned non-rigid airship *Pilgrim*, turned out several years ago, was again assembled in September, 1927, when a supply of helium was made available to the Akron company by the Government. The tiny ship of 53,000 cubic feet capacity, was flown to Detroit and participated in the flying activity before and after the start of the International Balloon Race, September 10. The *Pilgrim* was operated by Goodyear pilots during the winter of 1927-28 and employed for practical flying training by students in the Goodyear aeronautic class, inaugurated in the fall of 1927. This class, composed of a small group of Goodyear employees, in addition to airship handling and flying instruction at the Wingfoot Air Station of Goodyear, near Akron, is studying aeronautics in the classrooms of the Goodyear Industrial University under the direction of company aeronautic men.

In the 1927 Elimination Balloon Race, W. T. Van Orman and W. W. Morton of Goodyear were winners, this being the fourth victory for Van Orman.

Accessories, Equipment, Materials and Supplies

The demand for aircraft occasioned by the great strides made in commercial aviation last year has kept the manufacturers of aircraft accessories, equipment, materials and supplies busy with development and production work to keep pace with the needs of the hour.

There have been important additions to the list of these manufacturers, large increases in working capital, and a few changes in the name or management of old established concerns. A roll call of this branch of the aircraft industry for the high spots in the story of the production of accessories and supplies for aeronautical activities show a healthy and prosperous state of affairs during the year 1927.

The A. C. Spark Plug Company of Flint, Mich., continued to develop, perfect and produce spark plugs especially fitted to meet aeronautical requirements.

The Aeromarine Starter Company of Keyport, N. J., placed in production an improved Model D Starter in various hand, cranked, electric and combined hand and electric forms, which has an energy capacity sufficient for all aircraft engines up to and including 800 H. P.

The Aero Supply Manufacturing Company, of College Point, N. Y., supplied the industry with special parts and standard fittings and accessories of high perfection for aircraft use, and developed a number of special accessories.

Air Associates, Inc., of New York City, conducts a unique commercial aviation bureau where aircraft products are displayed and sold, facts and information concerning all phases of aeronautics are kept tabulated for ready reference, and consulting aeronautical engineering services are available for clients.

The Allison Engineering Company of Indianapolis, has carried on general development in aircraft motors, in addition to the design and construction of such items as superchargers, reduction gears, air-cooled cylinders, etc. Much successful experimental and production work has been accomplished for the Army Air Service, both in engines and accessories.

The Aluminum Company of America, Pittsburgh, Pa., produced a large proportion of duralumin in sheets, structural shapes, castings and forgings, which have become so necessary in the construction of modern aircraft and propellers. This company continued its reliable research work for the perfection of aluminum products and protection of the material against the effects of the elements.

American Airports Corporation of New York, composed of business men, aviation experts, architects and engineers, locates, designs, develops and manages airports. The corporation has been retained as a consultant on the international airport that is being established at Newark, N. J., and is working with numerous other cities in various stages of airport development.

The American Gas Accumulator Company, of Elizabeth, N. J., developed the A. G. A. Field Flood Light to meet the demand for a flood light which will produce adequate illumination of a moderate size airport at low initial and operating costs.

American Telephone & Telegraph Company of New York, through the Bell Telephone laboratories, devoted part of its research facilities to studying the problems of extending and improving communication services to airways and operators when required. This company has included in its 1928 program a substantial amount to be devoted to the advancement of safety in aviation by the application of electrical communications.

William E. Arthur & Company, Inc., of New York, are engaged in airport development, including selection and engineering surveys, construction, supervision and management. They have conducted these operations for some years and their work is to be found in many parts of the country.

B. B. T. Corporation of America, of Philadelphia, Pa., developed many improved units during the year for the illumination of airports and airways. These include a revolving shutter for landing flood lights which permits a pilot to land and taxi directly toward the light



BEACONS OF B. B. T. CORPORATION OF AMERICA
 (Top Left) Type H8D, Intermediate Landing Flood Light. (Bottom Left)
 Flashing Beacon, Type 25. (Top Right) Flashing Beacon, Type H5.
 (Bottom Right) Landing Floodlight, Type M8D.

in a narrow path of darkness; a new and improved type of landing flood light; two types of flashing beacons for airports and airways; and a new type of flood light for exterior and interior hangar illumination.

Bendix Brake Company of South Bend, Ind., added to their extensive line of automobile brakes, a highly successful line of



Hangar Illuminated by B. B. T. Lighting Equipment.

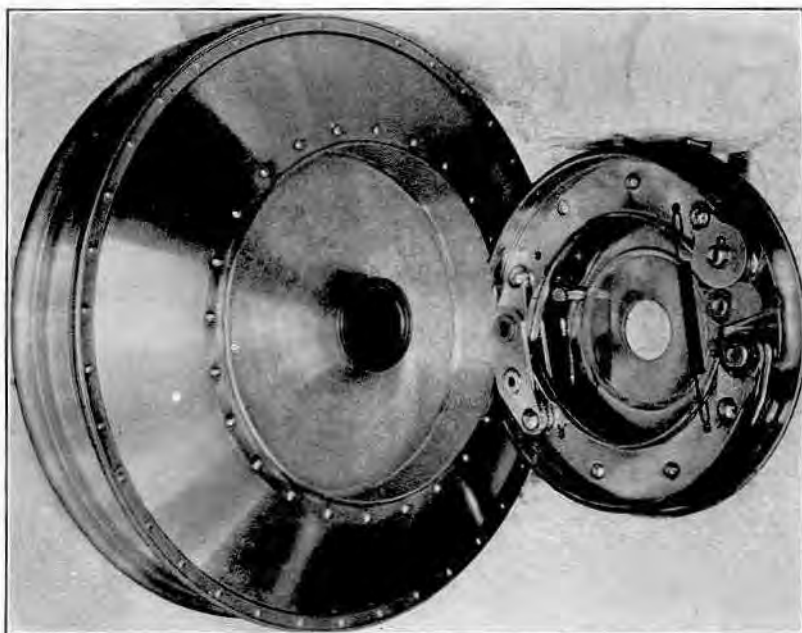
brakes especially designed for aircraft. They acquired, in 1927, I. M. Laddon's rights in the plane and brake types of disc wheels developed by him at McCook Field. The Bendix company is now manufacturing wheel and brake units which have become part of the standard equipment on all modern military and commercial aircraft.

Berry Brothers, Inc., of Detroit, Mich., continued to supply aircraft "Berryloid," a pyroxylin lacquer finish for fabric and metal, which is finding extensive use in commercial aircraft manufacture.

Bohn Aluminum & Brass Corporation of Detroit, Mich., are producers of metal castings for use in the manufacture of aircraft.

They engaged in extensive production of aluminum and brass castings for aircraft last year.

Brewster & Company, Long Island City, N. Y., well-known in the automotive industry, contributed new types of all-metal aircraft floats which were used by Vought, Loening, Beeing and others. They are also extensive manufacturers of ammunition boxes, fuel



Bendix-Ladden Disc Wheel and Brake, showing the 2-shoe Servo Brake completely constructed of Dural and the all-Dural wheel with special alloy integral hub and drum.

and oil tanks, steel tubular surfaces, skis, and other essential parts and accessories.

Carpenter Steel Company of Reading, Pa., supplied many manufacturers with special and standard products and alloys, as the result of their extensive research and production in development of alloys suitable for aircraft construction.

The Curtiss Aeroplane and Motor Company, Inc., of Garden City, N. Y., continued to manufacture the well-known Curtiss-Reed duralumin propellers. Two types are produced—the "D" type twisted from a flat slab of rolled metal, and the "R" type forged

from a solid ingot. Both are single piece propellers and are widely used on military and commercial aircraft in the United States. Continued research has resulted in improved methods of handling and inspecting the metal from a metallurgical standpoint with constant increase in the life of these propellers. Considerable development work has also been done on the "A" type propeller, a refinement of the twisted type incorporating a steel sleeve which eliminates the old style of propeller hub. This type has been successfully flight tested.

E. I. DuPont de Nemours & Company of Wilmington, Del., with their huge facilities have become extensive manufacturers of airplane dopes and finishes, Fabrikoid, and Pyralin sheeting for aircraft. New developments include an airplane duco finish especially designed for application over doped fabrics. The DuPont Viscoloid Company, a subsidiary of the DuPont company, manufacture Pyralin gasoline tank gauges, running lights, dial faces for instruments, and sheeting for windows. The outstanding advantage of Pyralin for these purposes is that it is a substitute for glass and does not splinter.

The Eastman Kodak Company of Rochester, N. Y., have further developed the super-sensitized anchromatic film for aerial photographic work.

Eclipse Machine Company in its Orange, N. J., plant has continued with the development and manufacture of starters for aircraft engines. Additions to its line during the year include a hand turning gear and an electric starter for small engines. A new concentric inertia starter for engines up to 2,500 cubic inch displacement is also available. The company also manufactured voltage-regulated electrical generators for aircraft.

The Edo Aircraft Corporation of College Point, N. Y., built an interesting line of standardized all-metal floats made of "Alclad" metal for small commercial aircraft. During 1927 this company produced 42 floats as against 28 in 1926 and in addition the company also produced 26 type E floats last year.

The Electric Storage Battery Company of Philadelphia, Pa., carried on with its huge production a standardized line of aircraft batteries for all purposes, as well as co-operating with the United States Army and Navy on the development of aircraft batteries for special purposes.

Elgin National Watch Company of Elgin, Ill., as a by-product of its manufacture of watches, contributed a Unit Control Board for aircraft in which the instruments are conveniently grouped on an

instrument board indirectly lighted. This company also manufactures the Elgin Chronometric Tachometer.

The Fairchild Aerial Camera Corporation of New York, continued its development of aerial photographic apparatus. It has developed the double checking method whereby distortion may be more easily corrected. Its development of a new camera shutter enables 50 per cent increase in photographic production. The company also has brought out a new focal plane camera, especially designed for oblique work.

Follmer, Clogg & Company of Lancaster, Pa., extensive manufacturers of umbrellas and parasols have entered the aircraft field in the manufacture of parachutes. Long years of careful experimentation have resulted in the creation of the successful line now produced by the company.

The General Electric Company of Schenectady, N. Y., with their huge facilities and resources of capital and expert personnel, co-operated with the Government in the development of a geared type of supercharger for air-cooled radial engines. This supercharger is designed as an integral part of the engine and is being supplied on air-cooled engines now being produced for the Navy. The company also contributed in 1927 a new type of 24" revolving beacon for airports and airways and a new automatic lamp changer for use with this beacon. Other contributions of this company include an improved type of boundary and obstruction lights for airports and an airport twin flood light.

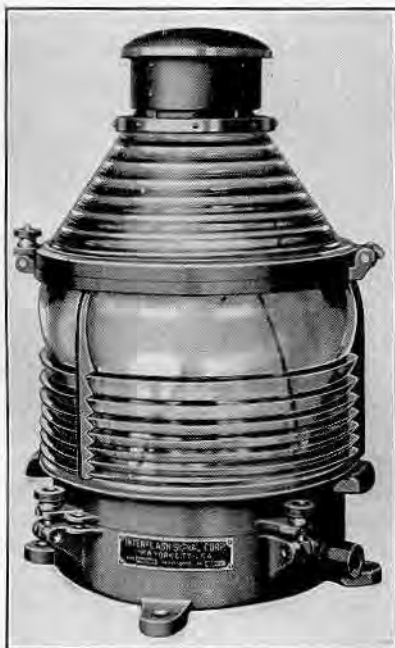
The Hamilton Aero Manufacturing Company of Milwaukee, Wis., produced during the year a quantity of Hamilton variable pitch metal propellers, using the type of steel hub developed by the United States Army Air Corps. One of its new developments is a three-piece, adjustable pitch, adjustable diameter metal propeller, designed especially for aircraft engines in the 100 H. P. class.

The Hamilton company also produces all-metal pontoons for commercial aircraft in several styles. This company also manufactured during the year a rectangular beam flood-light for airports.

The Hartzell Walnut Propeller Company of Piqua, Ohio, as pioneers in the production of high-grade lumber and in the perfection of processes of propeller construction, have continued their operations in the manufacture of wooden propellers during the year.

The Haskelite Manufacturing Company of Chicago, Ill., continued to manufacture with its extensive facilities, Haskelite blood-glue plywood, specially adapted to aeronautical use. Their products are extensively used by a very large percentage of aircraft manufacturers in the United States.

Interflash Signal Corporation of New York in addition to their general automatic flashing signal equipment are also engaged in the manufacture of aviation beacons. Their latest model of aviation beacon is 375 mm. The company have gone into extensive produc-



375 mm. Automatic Aviation Beacon
of Interflash Signal Corporation.

tion of aviation beacon lights for landing fields and airways in response to the heavy demand resulting from the laying out of many fields and airways for night flying.

Irving Air Chute Company of Buffalo, N. Y., produced a large number of "Irvin" Parachutes for Army, Navy and commercial use. This parachute has been responsible for saving 75 lives in the United States alone. During the year the Irving Company by extensive experimental and development work in co-operation with the American Cloth Weavers, produced a reliable and safe parachute constructed entirely of American materials. This has been developed in order that it may be available to the Services in case of war-time emergency.

Johnson Airplane & Supply Company of Dayton, Ohio, furnish a full line of airplane and engine parts and accessories. They feature with a great deal of success Johnson's Approved Log Books for keeping flying records straight. The company also features a one-hand automatic fire extinguisher which was developed by the Army Air Corps at McCook Field.

The Kelsey-Hayes Wheel Corporation of Detroit, Mich., as a division of their auto-wheel manufacturing business, produced landing wheels for aircraft in several sizes. Developments include a 20,000 pound capacity wheel for the Loening amphibian and a new line of off-set rim wheels especially suited for use with split type landing gears.

Leece-Neville Company of Cleveland, Ohio, continued to pro-

duce its well-known and popular line of voltage-regulated electrical generators which are part of standard equipment on Army and Navy aircraft and widely used on commercial airplanes.

Ludington Philadelphia Flying Service, of Philadelphia conducts a general flying operation including an excellent course in flying instruction. The company does a large volume of aerial taxi work. It is the agency for Fairchild and Waco airplanes.

MacWhyte Company of Kenosha, Wis., are large manufacturers of streamline and round wires for both external and internal bracing of aircraft. This company developed during the year a new terminal for wires and tie rods which eliminates danger of damaging the tie-rod by screwing up the lock-nuts too tightly.

Meisel Press Manufacturing Company of Boston, Mass., in connection with their standard production supplied a complete line of gears for special use in airplane engines for many of the motor manufacturers.

The Moto Meter Company of Long Island City, N. Y., whose well-known automotive specialties have given them a prominent position in that field, continued to produce accessories especially designed for the indication and regulation of aircraft motor temperatures.

The National Airway Terminals, Inc., of New York, offers experienced management to airport corporations, municipalities and airport committees. Its purpose is to make airports under its control show a financial return to the investors interested in the project.

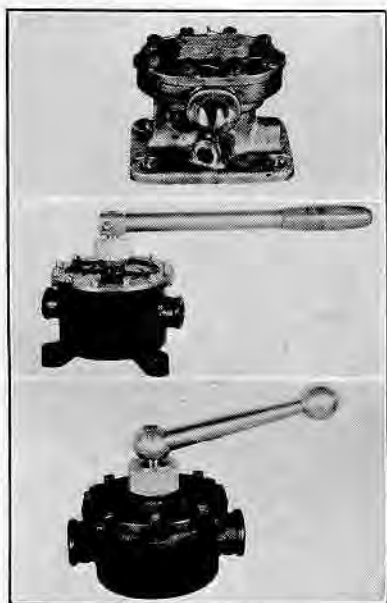
National Steel Products Company of Dayton, Ohio, produces fuel pumps, strainers, valves, unions, and other metal fittings on a large scale for both Army and Navy service aircraft as well as for many commercial planes.

New Jersey Veneer Company of Paterson, N. J., continued to supply special plywoods to the aircraft industry in increasing quantities and success.



Moto Meter for Aircraft made by the Moto Meter Co.

Norma-Hoffman Bearing Company of Stamford, Conn., as a part of their standard line, supplied the industry with all types of ball and roller bearings, ranging from the large roller bearings in aircraft engines to the tiny ball bearings in delicate aircraft instruments.



NATIONAL STEEL PRODUCTS COMPANY
(Top) Fuel Pump, Type C-5. (Center) Hand Refueling Pump, Type D-3. (Bottom) Fuel Pump, Hand Starting and Emergency Type D-2.

Paragon Engineers, Inc., of Baltimore, concentrated on the development of moulded and twisted interlaced wood fibre propellers of exceptional lightness. These propellers have been used on a number of commercial planes with highly satisfactory results.

Park Drop Forge Company of Cleveland, Ohio, in connection with their extensive business in other lines, manufactured crank shafts for aviation engines in large quantities for many of the motor manufacturers.

Perry-Austin Manufacturing Company of Grasmere, Staten Island, one of the pioneer producers of varnish, dope, and other finishes for aircraft use extended their operations in this field, supplying many of the manufacturers with their products.

Pioneer Instrument Company of Brooklyn, N. Y., well-known

manufacturers, inventors and designers of aeronautical instruments, particularly the famous earth inductor compass, improved and refined its products during the year. Its work included the development of a new climb and descent indicator, an improvement of the earth inductor compass. The Pioneer company is also the distributor for the Wiley Parachute Flare for aircraft.

The Pitcairn Flying School of Philadelphia has a course designed to equip students for the various Department of Commerce licenses issued for commercial flying. The courses involve complete flying instruction, including solo work and a regular ground school course. Three courses are given, namely, the preliminary 10-hour course designed to equip students for the private pilot's license of the

Department of Commerce; a 20-hour course, involving more advanced training and a 50-hour course for students desirous of securing an industrial pilot's license of the Department of Commerce.

Plane-Speaker Corporation of New York, continued to develop the "Voice of the Sky" for use in aerial advertising. This device is a large amplifier which is carried aloft in an airplane, and which transmits to the public below advertising messages, music and the like.

Radio Corporation of America of New York City, in connection with their extensive activities are builders of three types of radio transmitting and receiving sets which have been especially designed to give proper service under the difficult conditions prevailing in aircraft operation.

John A. Roebling's Sons Company of Trenton, N. J., as a special division of their huge plant, greatly increased their production of aircraft wire and cable during the year.

Russell Parachute Company of San Diego, Calif., continued with the refinement and production of the Russell "Lobe" type parachute through the incorporation of many new features. The unique design of this parachute is said to provide for a quick opening and slow descent without oscillation. It is used by both commercial and military pilots and has never failed to bring its load safely to earth. The Russell Cotton "Lobe" parachute is designed especially for use in connection with the slower speed type of planes, such as bombing, photographic, observatory, commercial and training. Both the Russell silk and the cotton "Lobe" parachutes are equipped with the company's new improved adjustable harness and positive action manually operated packs.

Scintilla Magneto Company of Sidney, N. Y., a subsidiary of the American Brown Boveri Company, manufactured on a large scale Scintilla aircraft magnetos which are widely used by engine manufacturers. A new type of vertical double magneto was produced during the year in co-operation with the Air Corps and is now undergoing service tests.

S. K. F. Industries of New York City, one of the largest and best known concerns in their field, manufactured roller and ball bearings of all types and sizes for the special uses of the aircraft industry.

Sperry Gyroscope Company of Brooklyn, N. Y., developed the High Intensity Arc Flood Light for airports. This light can be quickly converted to an emergency beacon or a ceiling light and has been installed on many airports in this country. One of the lights

furnished by the Sperry Gyroscope Company was a 62-inch arc searchlight giving 1,200,000,000 candle-power. This light is located on the top of the Virginia Public Service Company building at Charlottesville, Va., and its beam is so powerful that moving pictures were taken by it of Jefferson's home at Monticello, 13 miles distant. It is the most powerful searchlight in the United States.

The Splitdorf Electrical Company of Newark, N. J., produced their Model NS-9, a special light weight high-tension aircraft magneto. This model is the result of several years of experiment and research, and of great value to the aircraft industry.

Stewart-Hartshorn Company of New York City, in connection with their large general business, produced streamline and square-section wires and tie-rods for both external and internal bracing for many of the constructors of aircraft.

Standard Steel Propeller Company of Pittsburgh, Pa., continued to produce the well-known all-metal Standard Steel Adjustable Pitch Propellers largely used by both military and commercial services. During the year numerous refinements in design and methods of manufacture have enabled the company to produce a propeller of lighter weight and higher factor of safety. A process of etching all propeller blades, after completion, to guard against any possibility of defects, has been put into practice by the company.

Stromberg Motor Devices Company of Chicago, manufactured and improved upon their production aircraft carburetors as used by the principal aviation engine manufacturers in the United States. A new carburetor was developed, with the co-operation of the Army Air Corps and the Curtiss Aeroplane & Motor Co., and put into production for use on the Curtiss D-12 engine. A number of new carburetor types were designed and built for use on experimental engines being developed by well-known engine manufacturers. These models incorporate the standard Stromberg type of aid bled metering system and several are provided with jackets on the throttle half to prevent the formation of frost and ice and to assist in the vaporization of the fuel. Special attention has been given throughout the year to the development of carburetors adapted to the carburetion needs of radial air-cooled engines.

Summerill Tubing Company, Bridgeport, Pa. Produced steel tubing especially suited for aircraft use and developed "aircraft square" section for certain structural uses. This company also introduced the process of normalizing chrome molybdenum tubing at the mill thus improving the quality and uniformity of the product.

The Taylor Instrument Company of Rochester, N. Y., main-



Three Sperry High Intensity Floodlights, fitted with 80° Floodlight Lens, giving full spread of more than 180°, illuminating Airport 3,000 feet square during tests at Wright Field.



Grouped System of Westinghouse Airport Floodlight Projectors, Bettis Field.

tained a division of their technical department for the development of aircraft instruments including the improvement of the familiar small altimeter, the development of a six-inch altimeter for aerial photography and other purposes, and the development of a meteorograph for recording the performance of aircraft.

Thompson Products Company of Cleveland, Ohio, large manufacturers of standard and special fittings produced quantities of aircraft engine parts, particularly the well-known Thompson silchrome valves for many of the motor manufacturers.

Thurston Cutting Corporation of New York City, in the field of textile manufacture have specialized in production of "Dartmouth-Tex" high-grade cloths and tapes for aircraft use.

Titanine, Incorporated, Union, N. J., pioneers in its field manufactured its well-known line of dopes, paints, and finishes for aircraft use and considerably extended its operations.

The Travelers Insurance Company of Hartford, Conn., continued to serve the aeronautical field with its well-known insurance protection. This company has rendered great service by its thorough investigations of airplane casualties and by its conservative but effective coverage of the aeronautical industry.

E. S. Twining Company of New York is one of the best known concerns in the textile trade. Its product known as "Flightex Fabric" was especially developed for aircraft use and is extensively used by the industry.

The U. S. Hammered Piston Ring Company of Irvington, N. J., continued to furnish steel parts particularly piston rings for aircraft engines. It provided these supplies in very large quantity to the American aircraft industry during the last year.

Valentine & Company of New York, whose trade and reputation is world-wide, has produced Valspar and other well-known finishing materials for many of the aircraft manufacturers.

The Waterbury Tool Company of Waterbury, Conn., have added to their general line the manufacture of winches for handling airships, seaplanes and captive balloons.

Wellington-Sears & Company of New York, in addition to their extensive staple products, have specialized in the manufacture of fabrics for aeronautical uses.

Westinghouse Electric & Manufacturing Company in their immense plant at East Pittsburgh, Pa., besides manufacturing complete equipment for lighting landing fields and airways, also produces the Micarta propeller, whose basic material is a cotton fabric impregnated with phenolic resin which is moulded to shape under pressure. Another Westinghouse product is the Micarta control

pulley now in wide use. The Westinghouse company also manufactures complete equipment for lighting landing fields and airways, including airport flood light projectors, battery, approach, obstruction and hangar lights, transformers, and switches. Six landing fields in the United States were completely equipped by Westinghouse in 1927.

S. S. White Dental Manufacturing Company of New York, in addition to their regular line, produced an improved all-steel water and oil type tachometer shaft especially designed and of great utility for aircraft use.

The Winchester Repeating Arms Company of New Haven, Conn., are manufacturers of the "Cartridge" type of airplane radiator cores. This company perfected a thin wall radiator tube lighter than other types especially adapted to aircraft radiators. The Winchester company also experimented with a new type of tube having a long expanded end for sloping radiators, and also with baffling, or "Denting," the standard automobile radiator tubes to make them adaptable for aircraft use at lower cost and weight.

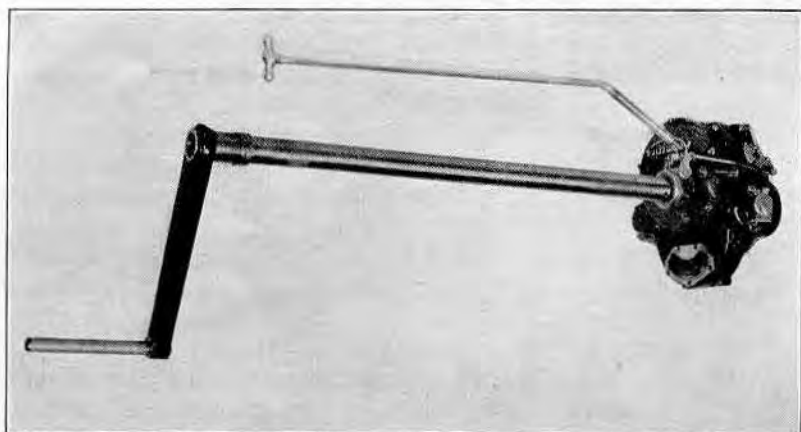
Wood & Spencer Company of Cleveland, Ohio, as an interesting part of their business continued to produce small metal parts, particularly screw machine products and connecting rods for many of the manufacturers in the aircraft industry.

Wyman-Gordon Company of Worcester, Mass., one of the largest drop forging concerns in the country extended their manufacture of aircraft engine crank shafts supplying the motor manufacturers on a large scale with their products.

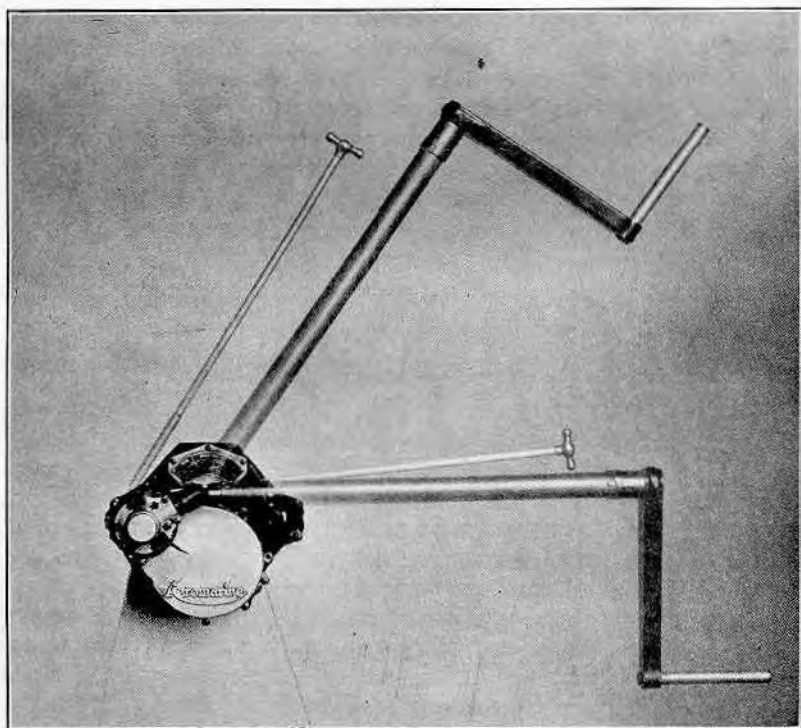
Fuel and Lubricants

Commercial aviation owes a debt to the big oil companies of the country for the very practical support that they are giving to commercial aviation. This co-operation is typical of the wise and generous management which has characterized this business and contributed so greatly to its success and to the advantage of the public. It consists, not only of research for perfecting their products for aviation purposes, but of extensive field work in servicing aircraft and huge plans, which some have undertaken, in the way of marking airways. The assistance which they have given to the campaign for greater air consciousness, and in the example they have set in the wide use of the airplane in their own business operations, is recognized not only by flyers, but by the public generally as one of the most substantial practical helps which aviation has received.

The Gulf Refining Company of Philadelphia, Kendal Refining



Aeromarine Inertia Starter—Type "DL." Longitudinal Cranking Attachment.



Aeromarine Starter—Type "DU." Universal Transverse Cranking Attachment Showing Joint Angles.

Company of Bradford, Pa., the Standard Oil Company of Indiana, the Standard Oil Company of New Jersey, the Texas Company of New York, the Vacuum Oil Company of New York, and the Wolverine Lubricants Company of New York, all heavy producers of aviation fuel and lubricating products, are among the companies rendering excellent service in an educational and practical operating way for the advancement of flying.

Exhibitions—Conferences—Dinners

The rapid and important developments in aviation throughout 1927 often called for leadership, to give impetus to well-directed plans or to apply a steadying influence when zeal and enthusiasm promised to outrun judgment. This was effectively met by the Aeronautical Chamber of Commerce of America, which, through the constructive work of its executive officers and its permanent and special committees, rendered a distinct service to sound aeronautical development.

In addition to its regular program of service, the work of the Chamber throughout the year was marked by a series of important conferences, receptions and aeronautical exhibits, of special significance and importance. As a typical instance may be cited the All-America Aircraft Display from May 2 to 6, 1927, at Washington, D. C., arranged under the auspices of the Aeronautical Chamber of Commerce of America, with the co-operation of the Air Corps of the Army, Bureau of Aeronautics of the Navy, Department of Commerce, United States Chamber of Commerce, National Aeronautic Association, and the National Advisory Committee for Aeronautics. Closely linked with the aircraft display was the conference of the Inter-American Commission on Commercial Aviation which drafted the form of a Pan-American Aviation Convention that resulted in the treaty perfected by the Sixth International Conference of American States at Havana in January, 1928.

Aircraft Exhibits and Meets

The All-America Aircraft Display was held in two large Air Corps hangars at Bolling Field, and proved to be one of the greatest exhibitions of advanced types of commercial and military aircraft and accessories ever assembled in this country.

The period of the Display was timed with the arrival at Bolling Field of the Pan-American Good-Will Flyers. Their reception and the opening of the Display was attended by a large gathering, including President Coolidge, the Cabinet, representatives of the diplo-



All America Aircraft Display held at Bolling Field, May 2 to 6, 1927, under Auspices of the Aeronautical Chamber of Commerce.

matic corps, and delegates to the Third Pan-American Commercial Conference, and the annual convention of the Chamber of Commerce of the United States as the guests of the officers of the Air Corps and the reception committee of the Aeronautical Chamber of Commerce.

The exhibition offered the visitors from foreign lands opportunity to visualize and comprehend the great strides made in the development and production of American aeronautical equipment of all kinds.

More than eighty firms had exhibits in the Display, while the United States Government had exhibits, representing the Air Corps of the Army, Bureau of Aeronautics of the Navy, Aeronautics of the Department of Commerce, Air Mail Service of the Post Office Department, as well as the aeronautical work of the United States Geological Survey and Forestry Service.

As a permanent record and souvenir of the Display, the Chamber prepared for the exhibitors an illustrated catalogue of the products of the industry printed in English, Spanish and Portuguese, copies of which were presented to all representatives of foreign countries as well as to the delegates to the annual convention of the United States Chamber of Commerce. The demand for the catalogue after the display resulted in the distribution of thousands of copies throughout the world.

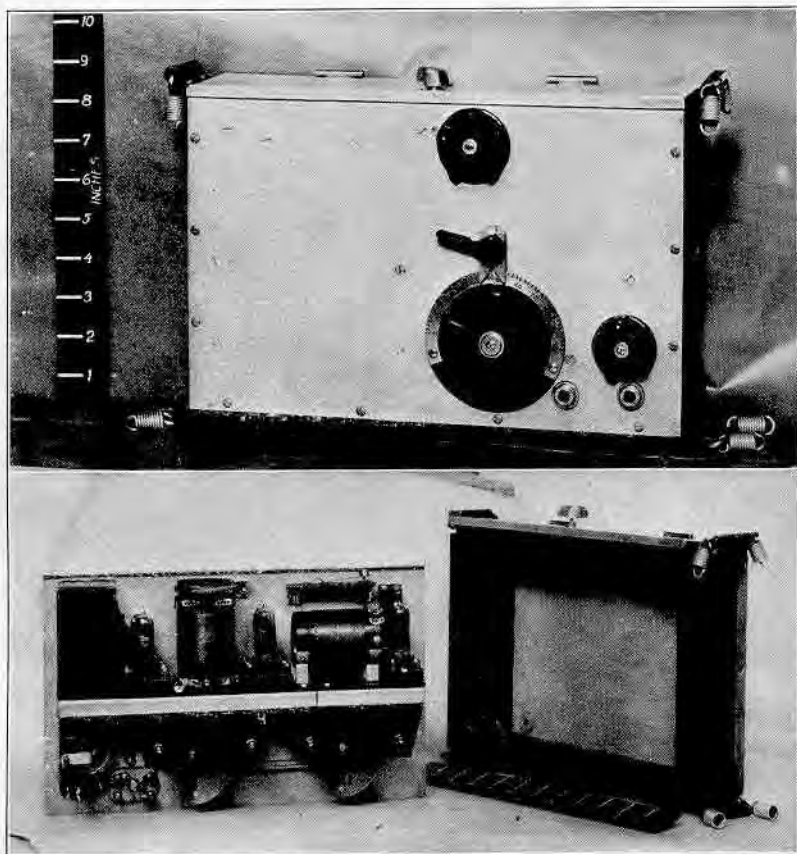
Among the commercial pilots and planes which flew to Bolling Field for the Display may be mentioned an Alexander high altitude "Eaglerock" flown by J. S. Charles of Richmond, Va.; a number of "Waco" 9's, including the following: one flown by Farnam Parker, belonging to the Ethyl Gasoline Corporation of New York; one to the Kreider-Reisner Aircraft Company of Hagerstown, Md.; one of the "Waco" 10's exhibited by the manufacturer, the Advance Aircraft Corporation of Troy, Ohio. All of the above were equipped with Curtiss OX-5 motors.

In addition to the All-America Aircraft Display, with the splen-"Show Case," which received the highest score in the 1926 Reliability Tour; an experimental monoplane built by the Anderson Aircraft Manufacturing Corporation of Anderson, Ind., and a Sikorski monoplane (a J. N. fuselage with Sikorski cantilever monoplane wing) flown by Henry J. White, sales manager of the Sikorski Manufacturing Corporation, attracted attention.

In the higher powered types of machines were the following:

Fairchild monoplane flown by Richard Depew; a Fokker "Universal" exhibited by the Atlantic Aircraft Corporation of Hasbrouck Heights, N. J.; Pitcairn three-passenger "Fleet Wing"; a Laird

"Swallow" mail plane; the Consolidated Aircraft Corporation's "Courier," flown by B. L. Whelan; a Stinson-Detroit cabin biplane, owned and operated by the Wayco Air Service, Inc., a subsidiary of the Wayco Oil Co.; a Ford-Stout three-motor all-metal mono-



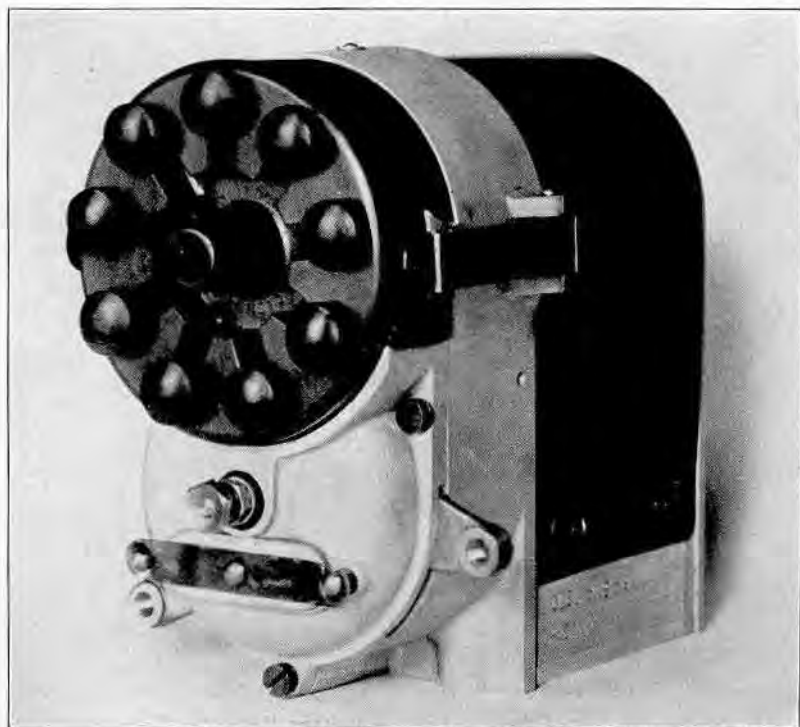
RADIO CORPORATION OF AMERICA RECEIVER.

(Top) Front View. (Bottom) Rear View with Case Removed.

plane; a Buhl "Airster," belonging to the Aeronautics Branch of the Department of Commerce; and a new type Buhl cabin plane, known as the "Air Sedan," flown by Louis G. Meister. All of these were powered with "Whirlwind" engines, manufactured by the Wright Aeronautical Corporation, Paterson, N. J.

Popular interest in the Display was heightened by the flying

demonstration given by military and civilian pilots and by the many flights given to the delegates to the Pan-American Conference and to the United States Chamber of Commerce, as well as to the general public. During the Display more than 4,000 persons were taken for short flights from Bolling Field. There was also a splendid demonstration of lighting equipment for night flying, in which the greatest interest was displayed by the public as well as the industry.

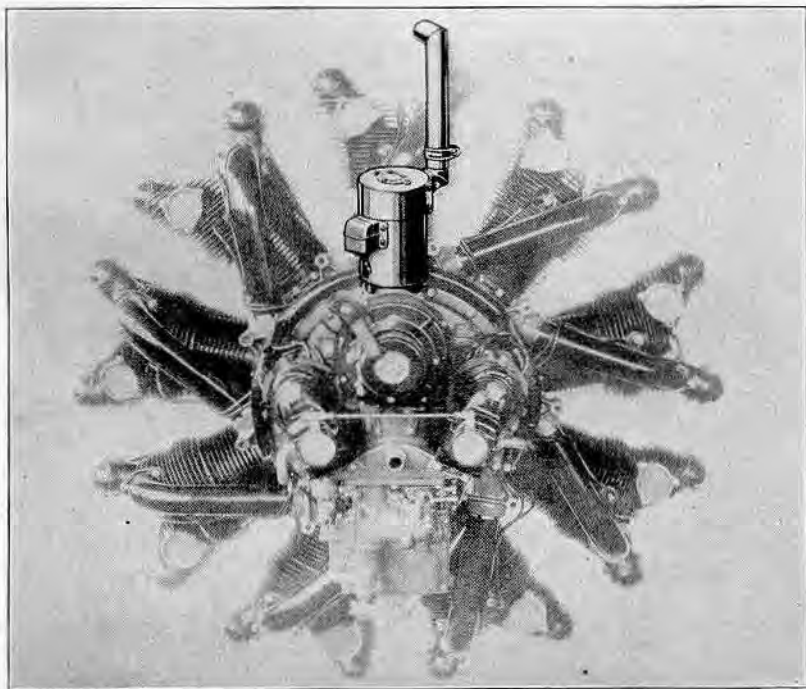


Splittorf Aircraft Magneto. Model NS-9.

In addition to the All-America Aircraft Display, with the splendid co-operation of Government and other agencies already mentioned, the Aeronautical Chamber co-operated in the holding of a number of other successful aircraft displays and airplane meets during the year. Among these were the shows and meets held at Rochester, N. Y.; Ypsilanti, Mich.; Boston, Mass.; Atlanta, Ga.; the annual National Reliability Air Tour for the Ford trophy, and the National Air Derby between New York and Spokane, Wash.

Pan-American Conference

A conference of probable far-reaching effect in our aeronautical relations with the countries of the Western Hemisphere, in which the Aeronautical Chamber of Commerce gave its fullest co-operation, was that of the Inter-American Commercial Aviation Commission previously mentioned, held at Washington from May 2 to 19, 1927.



Leece-Neville Type CD-1, 25 Ampere Voltage Regulated Generator
"Wasp" Engine.

This conference which was convened by the governing board of the Pan-American Union, was attended by delegates from Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Guatemala, Mexico, Panama, Peru, Salvador, Uruguay, Venezuela and the United States. The American delegates were William P. MacCracken, Jr., Assistant Secretary of Commerce for Aviation; Harry F. Guggenheim, president of the Daniel Guggenheim Fund for the Promotion of Aeronautics, and John Lansing

Callan, of Airships, Inc., a member of the Board of Governors of the Aeronautical Chamber of Commerce.

The conference prepared a report to the governing board of the Pan-American Union, offering a basis for a Pan-American air treaty. This report became the basis for the air convention drafted by the Sixth International Conference of American States at Havana, early this year. The authority of the underlying state in its sovereignty over the atmosphere above its territory and territorial waters; the freedom of passage of commercial planes in time of peace, subject to regulations established by the state traversed; the right of states to prohibit flight over certain military zones; and absolute prohibition against the carrying of war materials by commercial planes were among the more important principles agreed to by the conference in Washington.

At the conclusion of the Washington sessions, a tour of American cities was undertaken by the delegates for a study of aircraft plants, airways and air terminals in the United States. The party visited Philadelphia, Long Island, Albany, Buffalo, Cleveland, Columbia, Dayton, Detroit and Moundsville, W. Va.

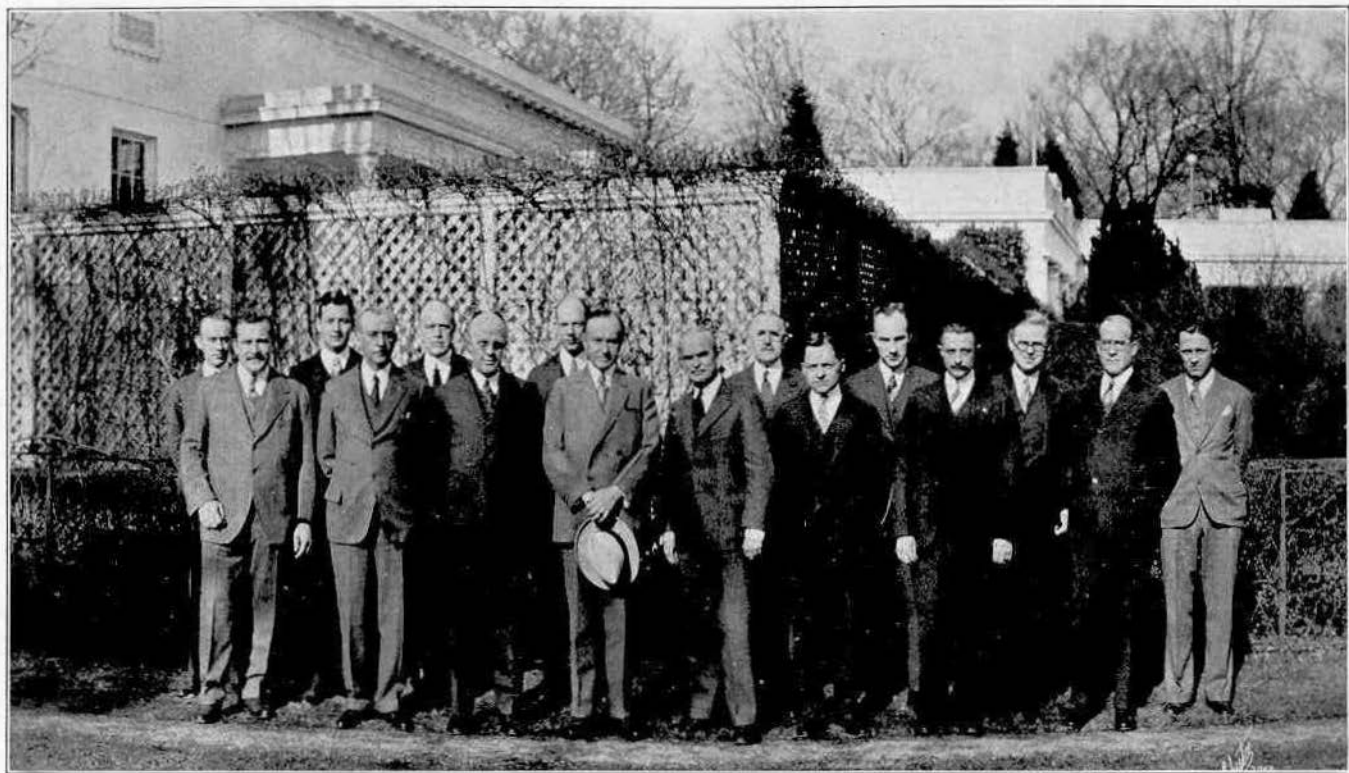
Conference on Regulations

Following the first year's experience under the operations of the Aeronautics Branch, the manufacturers and operators desired to get together for the purpose of exchanging views, and to this end Assistant Secretary William P. MacCracken, of the Department of Commerce, called a conference at Washington, D. C., on December 5-9, 1927, for a discussion of all phases of commercial air operations.

Realizing the importance of the entire aviation industry going into this conference with clear vision and understanding, crystalized and shaped into a program based on general accord, the Aeronautical Chamber of Commerce invited the operators, distributors, manufacturers and all persons directly concerned in commercial aviation in the United States to a series of preliminary conferences in the offices of the chamber in New York on December 1-3, 1927. Thirty-eight representatives of various aeronautical activities attended the first, 61 the second and 54 the third session of this conference. The results of the preliminary conferences in New York were evidenced in the conference at Washington, and made for a clear and harmonious discussion of the problems in hand.

Solidarity of the Industry

The rapid development in aviation in 1927 affected all sections of the country and created in the aircraft industry conditions that called for closer contacts between certain elements in the industry.



Officials and Board of Governors of the Aeronautical Chamber of Commerce of America at the White House, January 11, 1928.

(Front Row) Charles L. Lawrance, John F. O'Ryan, Paul Henderson,	(Rear Row) Owen A. Shannon, Sherman M. Fairchild, Samuel S.
President Coolidge, Chance Vought, Charles H. Colvin,	Bradley, George P. Tidmarsh, Lester D. Gardner, Harold
J. Lansing Callan, Frank H. Russell.	F. Pitcairn, Edgar N. Gott, John Harding, Jr.

In response to this need a meeting was held in Washington in December, 1927, by a group of commercial aircraft manufacturers to discuss the advisability of organizing as a special group to consider their particular problems. The Aeronautical Chamber of Commerce, on invitation, participated in this meeting. After a thorough discussion of the subject it was decided to organize a permanent Committee of Commercial Aircraft Manufacturers of the chamber to represent that section of the industry. This decision further unified and strengthened the industry and insured to its trade organization the benefit of solidarity as a basis for sound management and better direction.

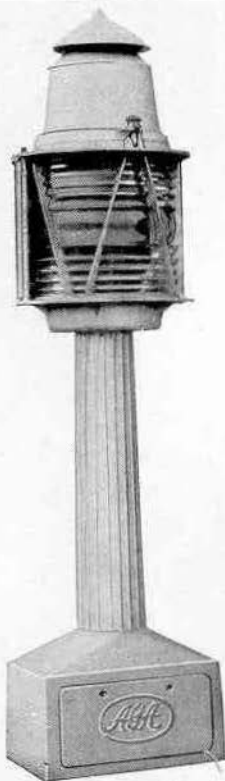
Dinners and Luncheons

The achievements of 1927 brought with them obligations of a social nature to the chamber. These functions consisted of a dinner to Col. Charles A. Lindbergh and a luncheon to Lieut. Lester J. Maitland and Lieut. Albert Hegenberger, as previously mentioned in this volume.

A luncheon was tendered also to Col. Francesco Di Pinedo at the Waldorf-Astoria, April 29, 1927, on the occasion of his visit in the course of his notable flight covering Europe, Africa, South and North America. The speakers on this occasion, in addition to Colonel Di Pinedo, were Assistant Secretary of War for Aeronautics F. Trubee Davison, Assistant Secretary of the Navy for Aeronautics E. P. Warner, and Assistant Secretary of Commerce for Aeronautics William P. MacCracken.

Later in the year a banquet was given in honor of Sir Philip A. G. D. Sassoon, British Under Secretary of State for Air, at the conclusion of his extensive visit to this country inspecting the trend of aerial progress in the United States. At this banquet at the Hotel Biltmore on November 3, 1927, Grover Loening presided as toastmaster, and with him at the speakers' table, besides Sir Philip Sassoon, were Wing Commander T. G. Hetherington, British Air Attaché at Washington; Hon. William P. MacCracken, Assistant Secretary of Commerce for Aviation; W. Irving Glover, Second Assistant Postmaster General; Clement M. Keys and Porter Adams, president, National Aeronautic Association; also Brig.-Gen. B. D. Foulois; Col. T. A. Baldwin; Maj. Clarence L. Tinker; Clarence Young, Director of Aeronautics; J. W. Iseman; Martin Dodge; Admiral H. I. Cone and Lieutenant Maitland and Art Goebel. The presence of the trans-Pacific fliers lent additional interest to the event.

The toastmaster, Mr. Loening, introduced Assistant Secretary



A. G. A. Landing Field Floodlight.
 Lens—180° Sector 500 m.m.
 Ground Dioptric.



Macwhyte Safe Lock
 Terminal.



Pioneer Flight Indicator. Turn and
 Bank Indicator combined with
 Climb Indicator.

MacCracken, who welcomed Sir Philip on behalf of our Government, and Mr. Keys, who gave him enthusiastic greetings from the aircraft industry.

Dinner to General Patrick

As a mark of appreciation of the splendid work of Maj.-Gen. Mason M. Patrick, who retired as Chief of the Air Corps, December 13, 1927, after forty-five years of Army service, the Aeronautical Chamber of Commerce tendered him a dinner at the University Club shortly after the New Year.

The dinner, which was held at the University Club, New York City, on January 5, 1928, proved to be one of the most successful of the year, and gave to leaders in aviation an opportunity to pay tribute to General Patrick's constructive work in behalf of aviation. The guests, besides General Patrick, were Hon. F. Trubee Davison, Assistant Secretary of War for Aeronautics; Maj.-Gen. James E. Fechet, Chief of the Air Corps; Maj. J. M. Reynolds; Rear Admiral H. I. Cone; Col. R. H. Young, and Capt. H. C. Richardson, U. S. Navy.

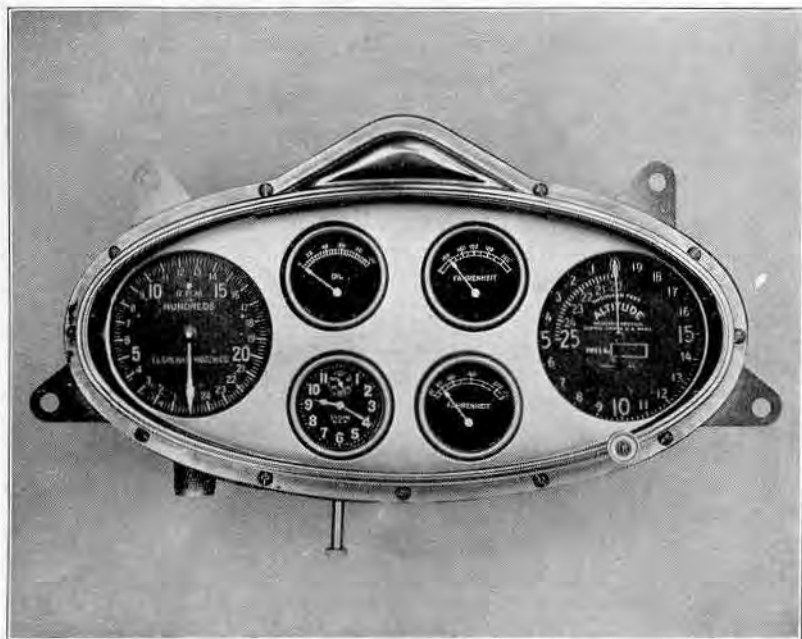
Routine Work of the Chamber

The year 1927, thus filled with interminable details relating to aircraft displays, air meets, preparation for conference, the aiding and entertaining of aeronautical missions and distinguished guests, constituted a task of no mean proportion. The year also saw the Aeronautical Chamber of Commerce in full routine operation, to meet the requirements of an industry suddenly taxed beyond normal capacity.

This work was not only greatly increased in volume, but most of it took on special importance through the suddenly created wide demand from the industry for accurate information in connection with aircraft production and aircraft operation. Special memoranda and sales bulletins to the number of 175 were issued, while the library of the chamber covered digests of 1,200 magazines on 350 different subjects of import to the industry. The Washington bureau of the chamber was subject to especially heavy demands by the members of the chamber, and during the year it sent out 23,000 pieces of mail covering every branch of governmental information of value to manufacturers and operators.

In addition, the chamber, by reason of its recognized position as a clearing house on all matters aeronautical, was called upon throughout the year to answer innumerable questions by the industry, the operators, the press, and a general public recently awakened to the possibilities of aviation.

Inquiries came from abroad as well as home, and seemed to emanate from every state and territory and insular possession of the country. They came from a wide range of commercial and professional activities, banking houses, statisticians, newspapers and magazines, insurance companies, motion picture operators, libraries, municipalities and chambers of commerce. The questions answered

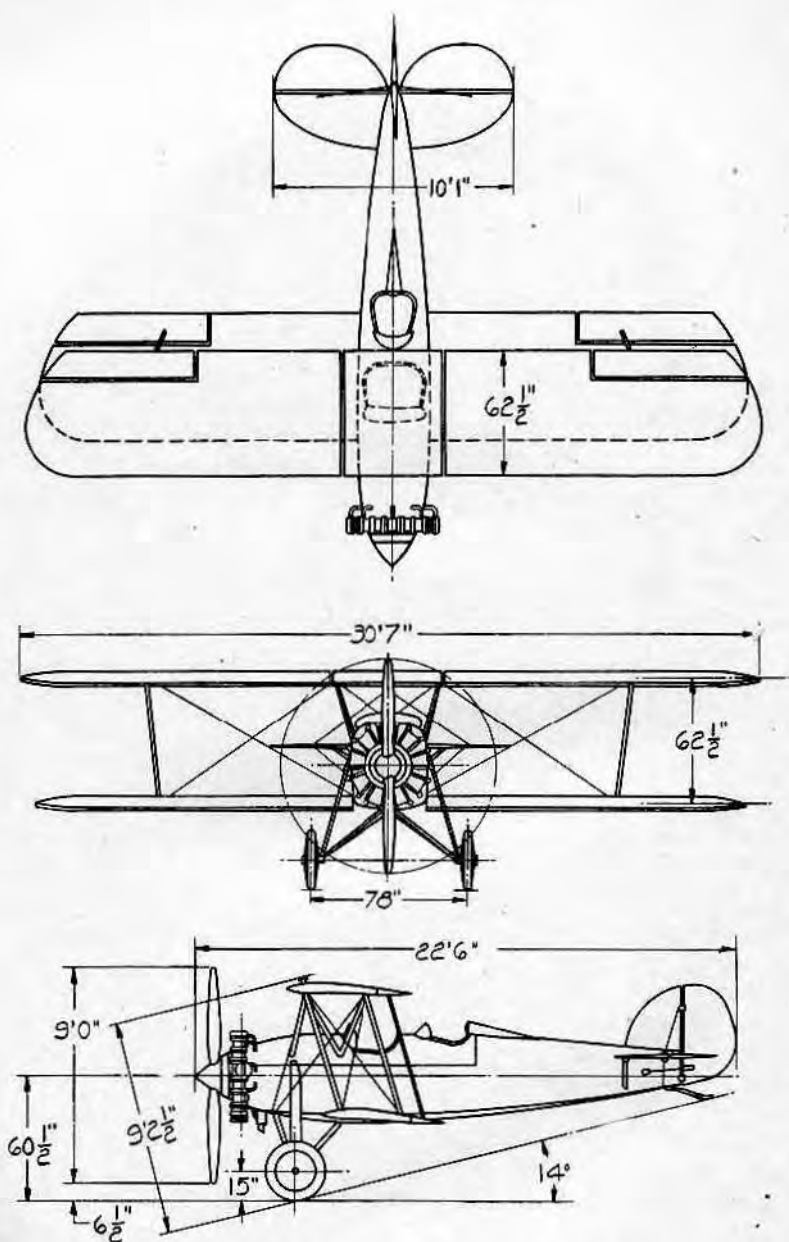


Elgin Unit Control Board.

covered manufacturing, air mail statistics, technical questions, bibliographies, industrial organizations, statistics, law and the general run of practical information that would be sought by a people suddenly and completely awakened aeronautically.

The greatly increased interest and appreciation of the work of the chamber is best illustrated by the rapidly growing membership, which at the time of going to press with this volume numbers 262, and is published in the Appendix.

**AIRCRAFT AND ENGINE DESIGN
SECTION**

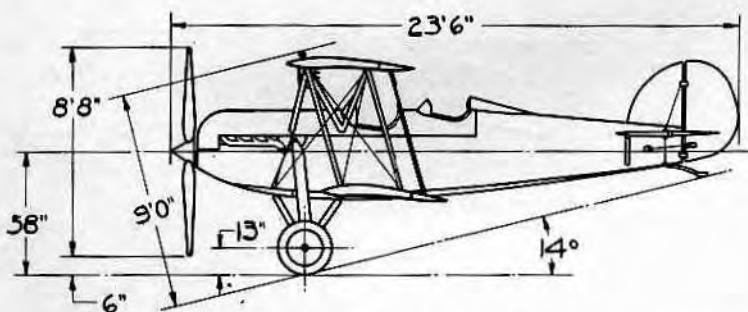
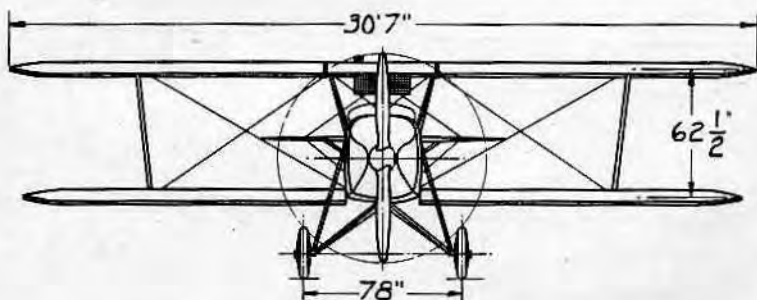
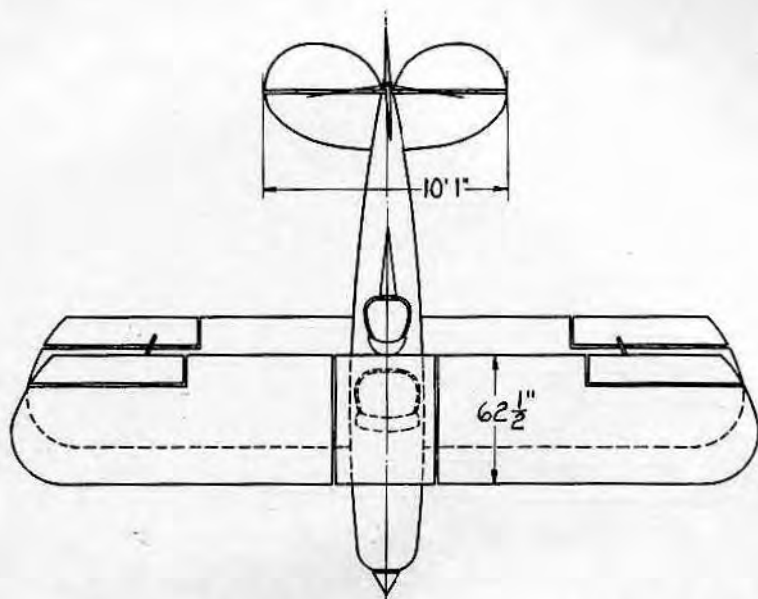


ADVANCE AIRCRAFT COMPANY

TROY, OHIO

"WACO TEN"

ENGINE—WRIGHT "WHIRLWIND"

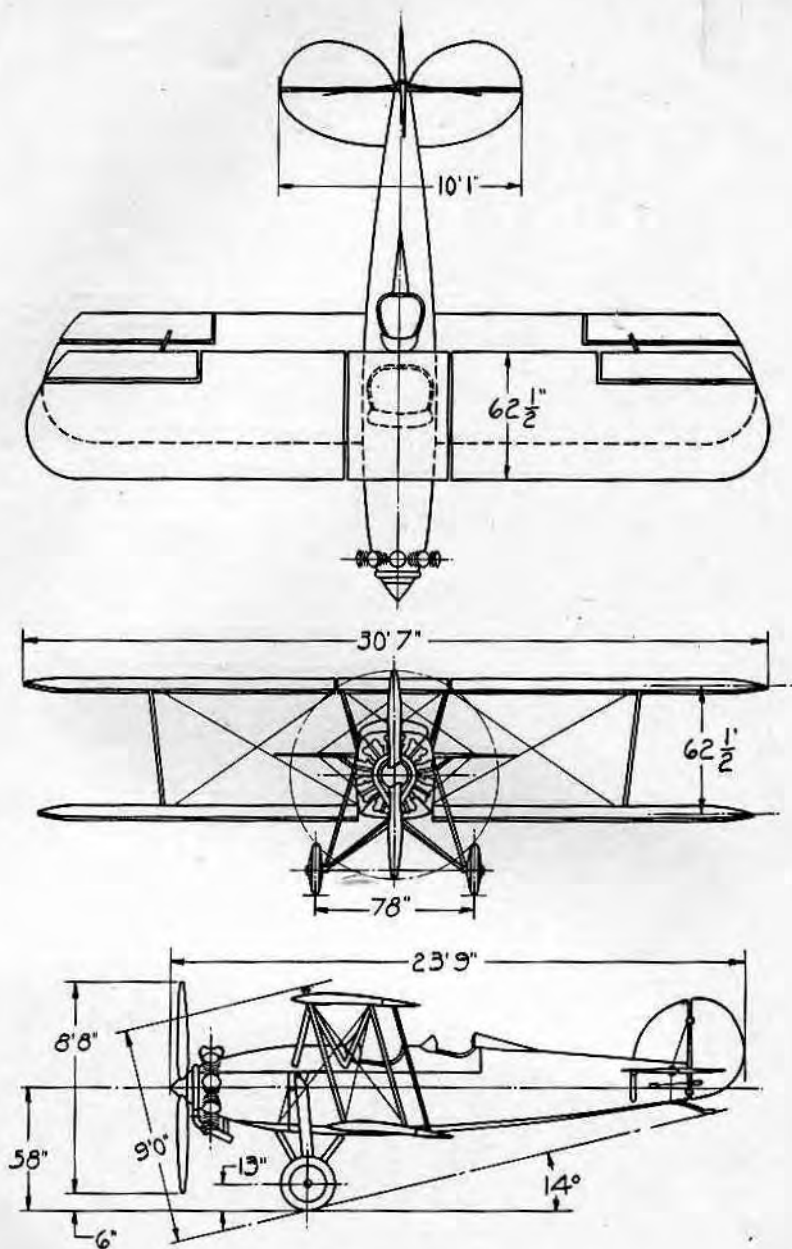


ADVANCE AIRCRAFT COMPANY

TROY, OHIO

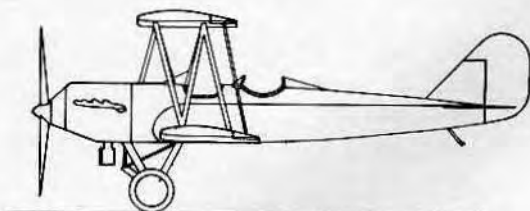
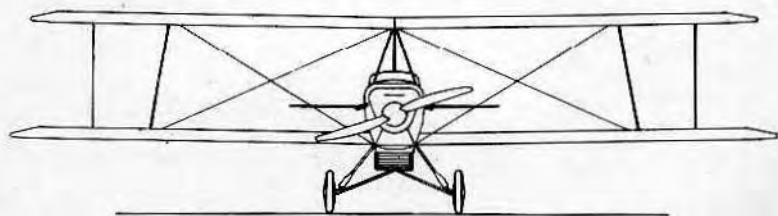
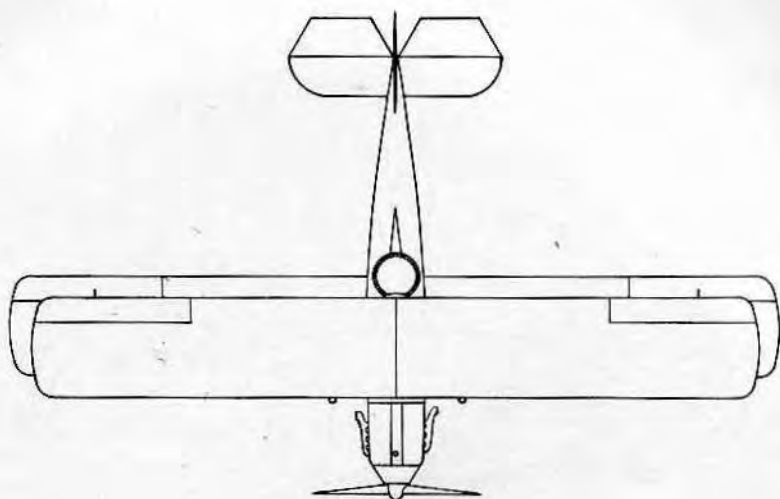
"WACO TEN"

ENGINE—CURTISS OX-5



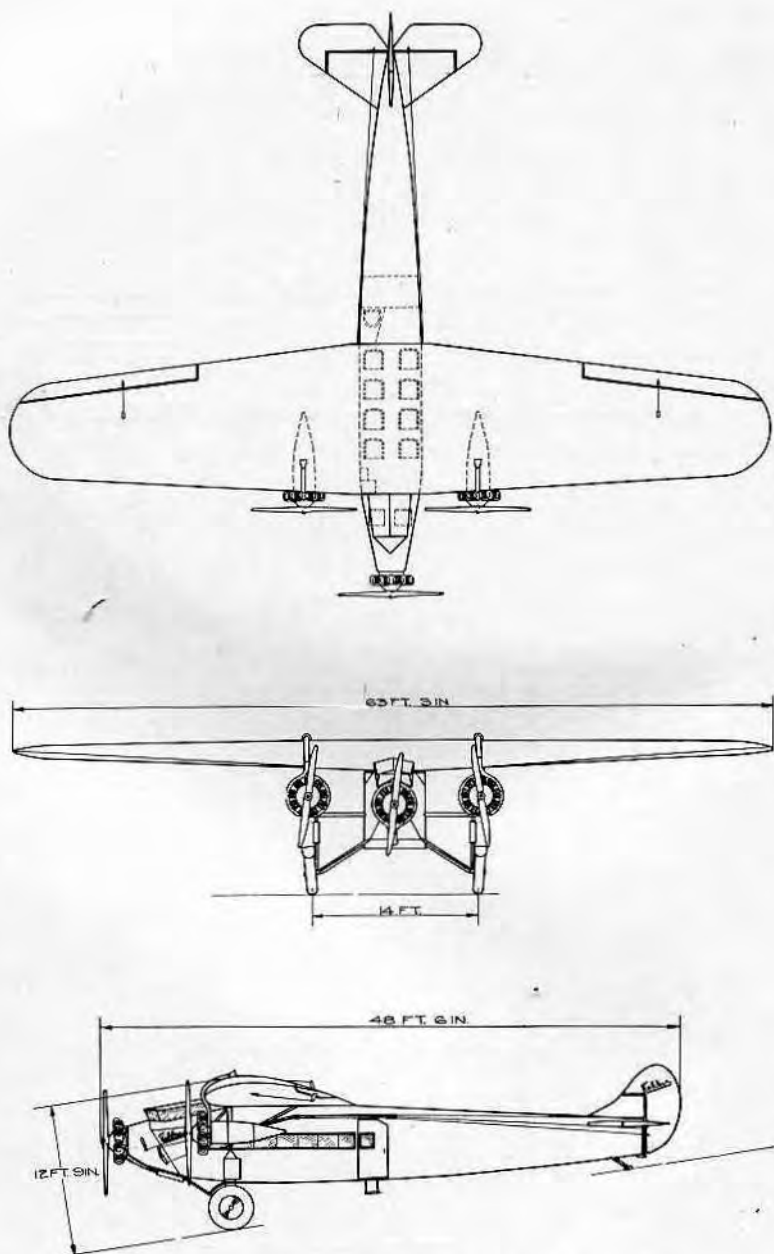
ADVANCE AIRCRAFT COMPANY
TROY, OHIO

"WACO TEN"
ENGINE—RYAN-SIEMENS

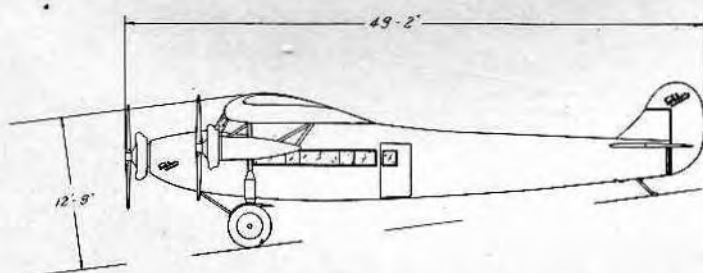
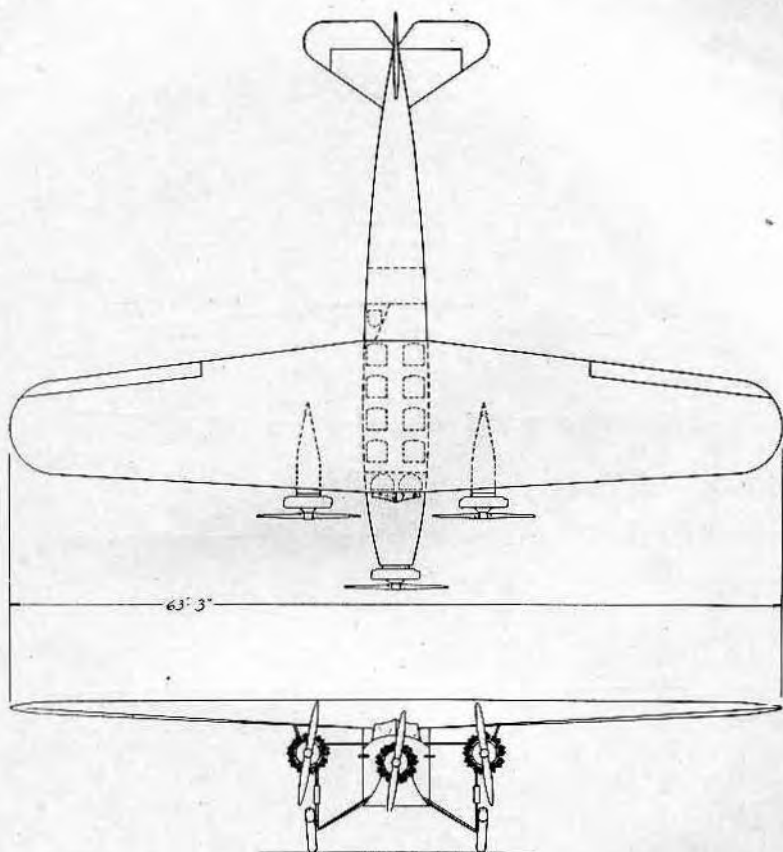


ALEXANDER AIRCRAFT COMPANY
DENVER, COLO.

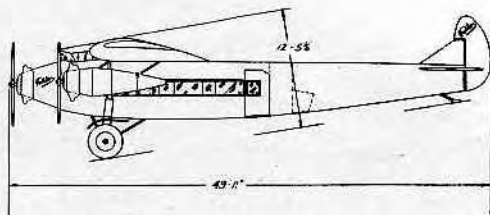
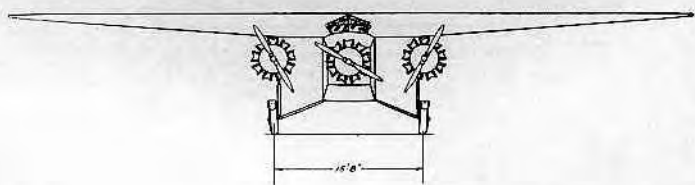
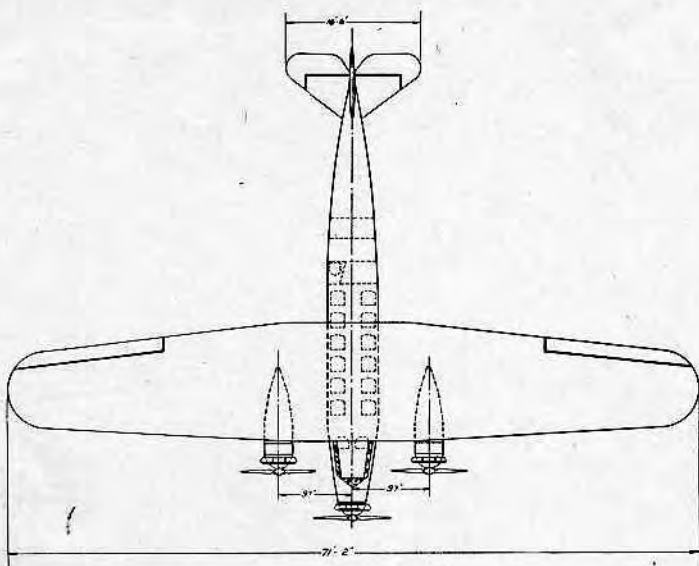
ALEXANDER "EAGLEROCK" (LONG WING MODEL)
ENGINE—CURTISS OX-5



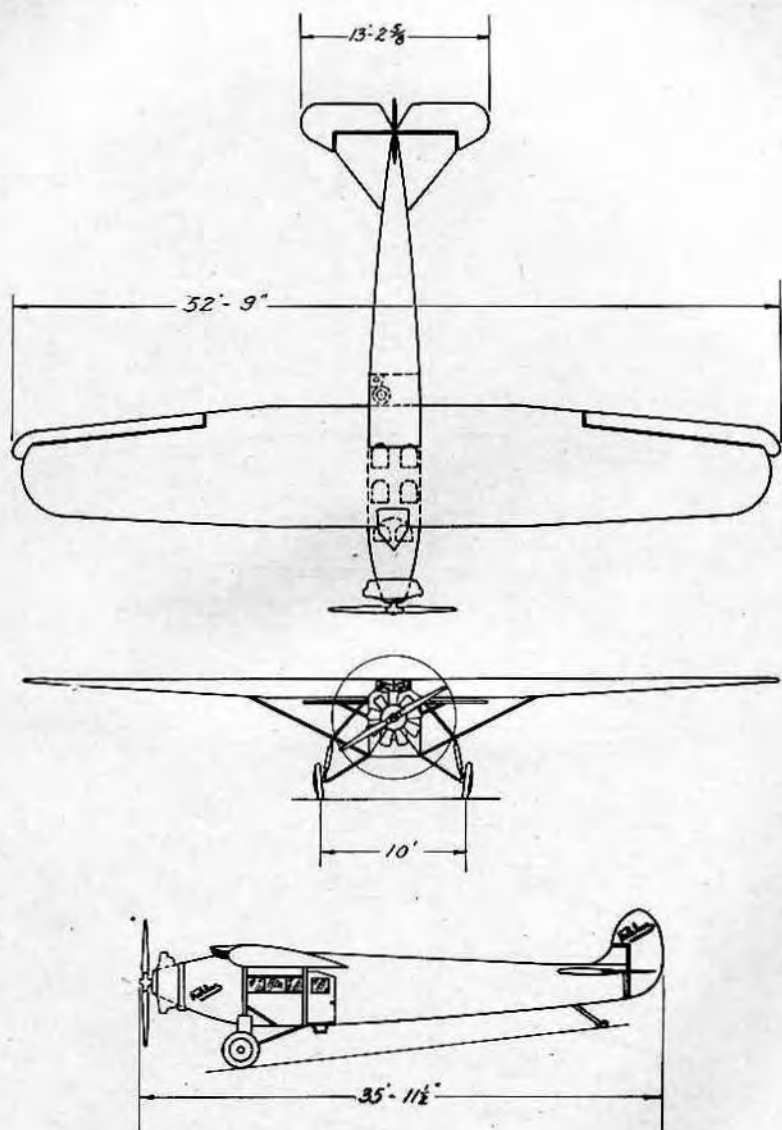
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 HASBROUCK HEIGHTS, N. J.
FOKKER C-2 COMMERCIAL TRIMOTOR TRANSPORT
 ENGINE—WRIGHT "WHIRLWIND"



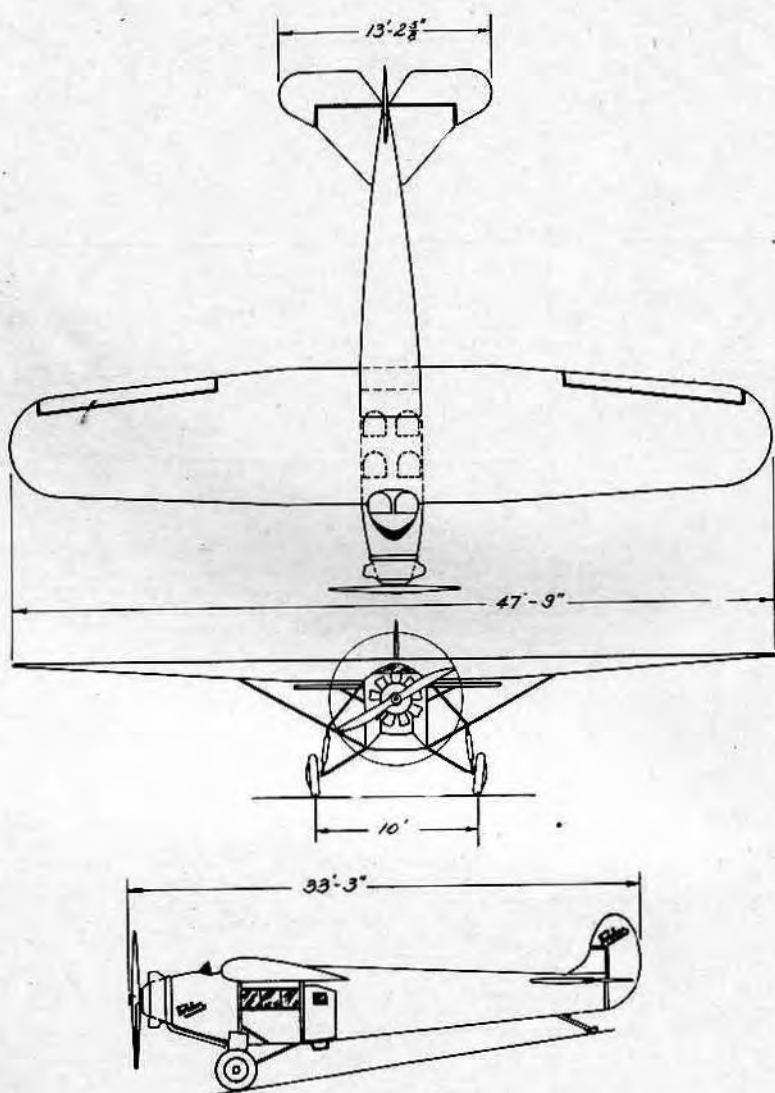
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 HASBROUCK HEIGHTS, N. J.
FOKKER F-7 TRIMOTOR TRANSPORT
 ENGINES—WRIGHT "WHIRLWIND"



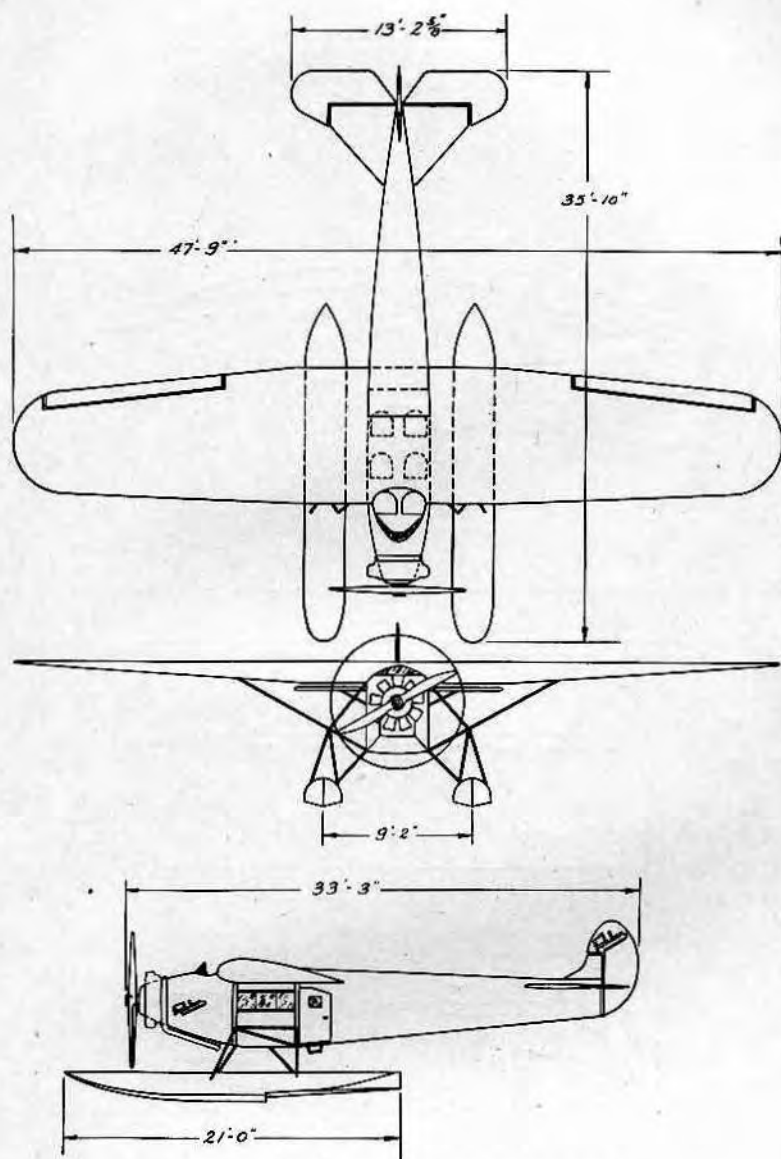
ATLANTIC AIRCRAFT CORPORATION
 HASBROUCK HEIGHTS, N. J.
FOKKER F-10 TRIMOTOR TRANSPORT
 ENGINES—PRATT & WHITNEY "WASP"



ATLANTIC AIRCRAFT CORPORATION
 HASBROUCK HEIGHTS, N. J.
FOKKER SUPER UNIVERSAL TRANSPORT
 ENGINE—PRATT & WHITNEY "WASP"



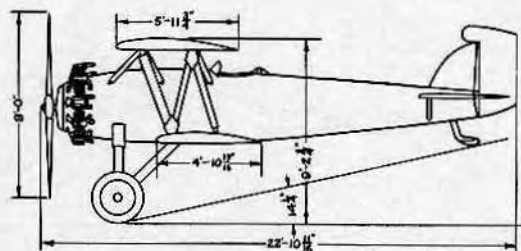
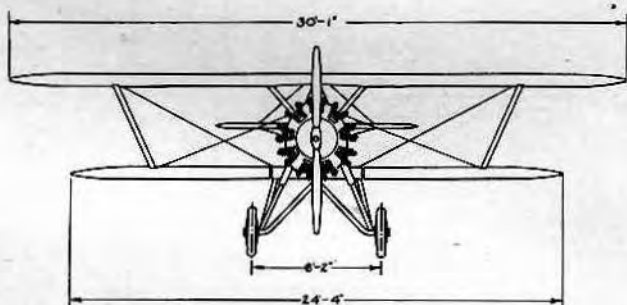
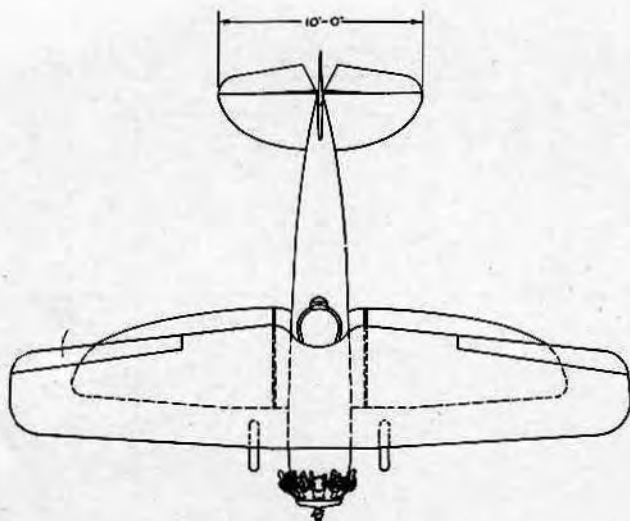
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 HASBROUCK HEIGHTS, N. J.
FOKKER "UNIVERSAL"
 ENGINE—WRIGHT "WHIRLWIND"



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HASBROUCK HEIGHTS, N. J.

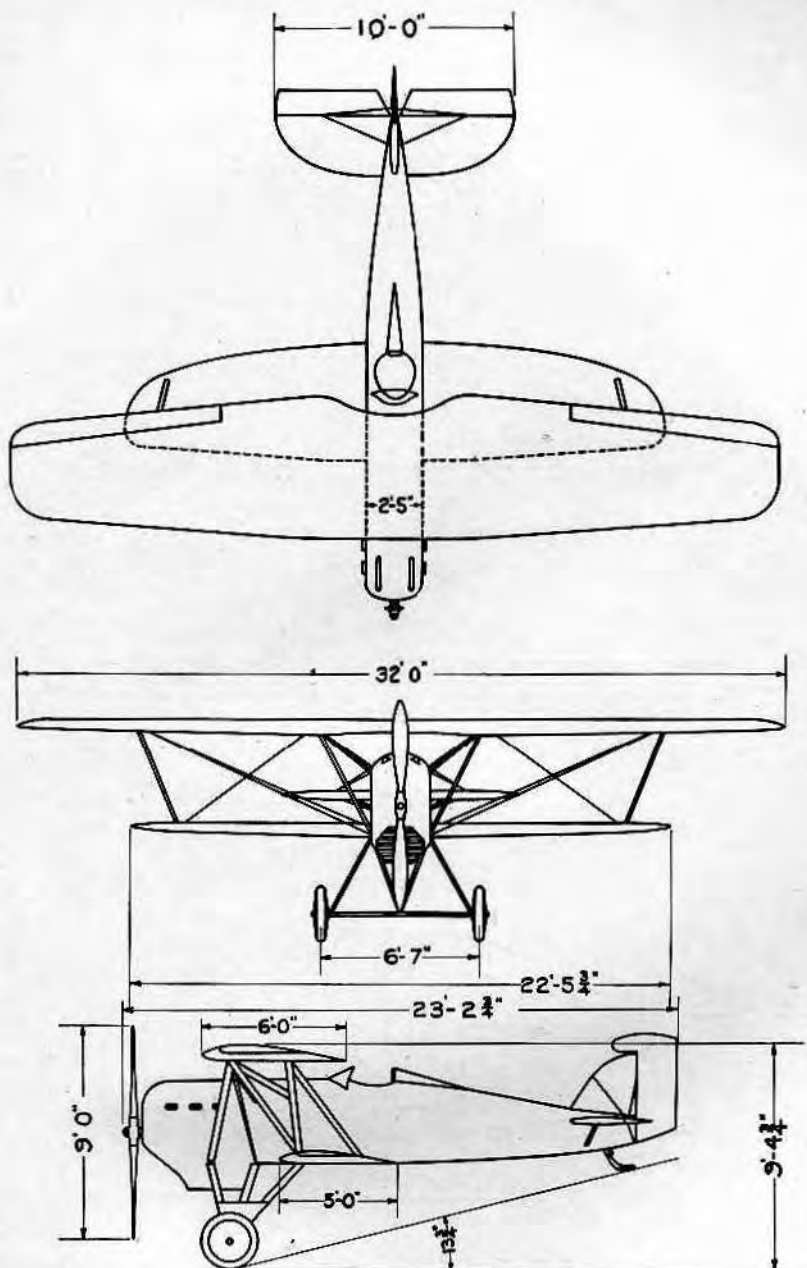
FOKKER "UNIVERSAL" SEAPLANE

ENGINE—WRIGHT "WHIRLWIND"



BOEING AIRPLANE COMPANY
SEATTLE, WASH.

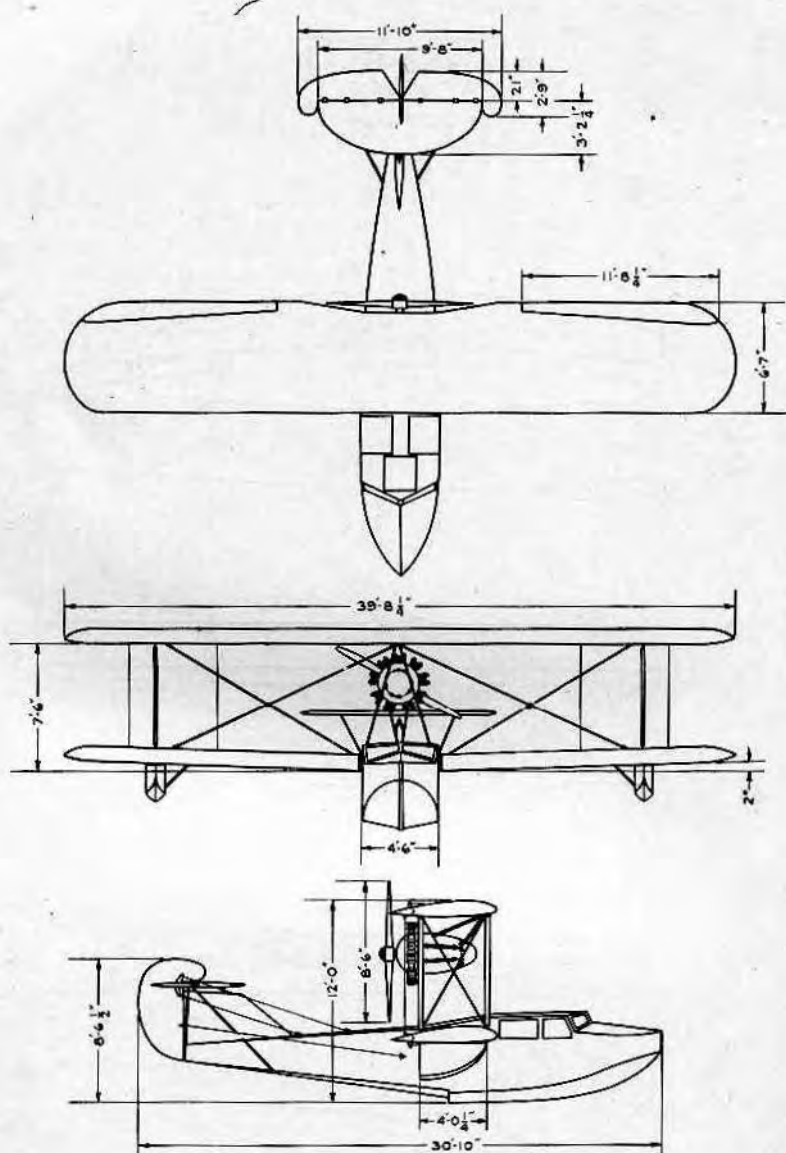
CARRIER FIGHTER F 2B-1
ENGINE—PRATT & WHITNEY "WASP"



BOEING AIRPLANE COMPANY
SEATTLE, WASH.

CARRIER TYPE FIGHTER FB-5

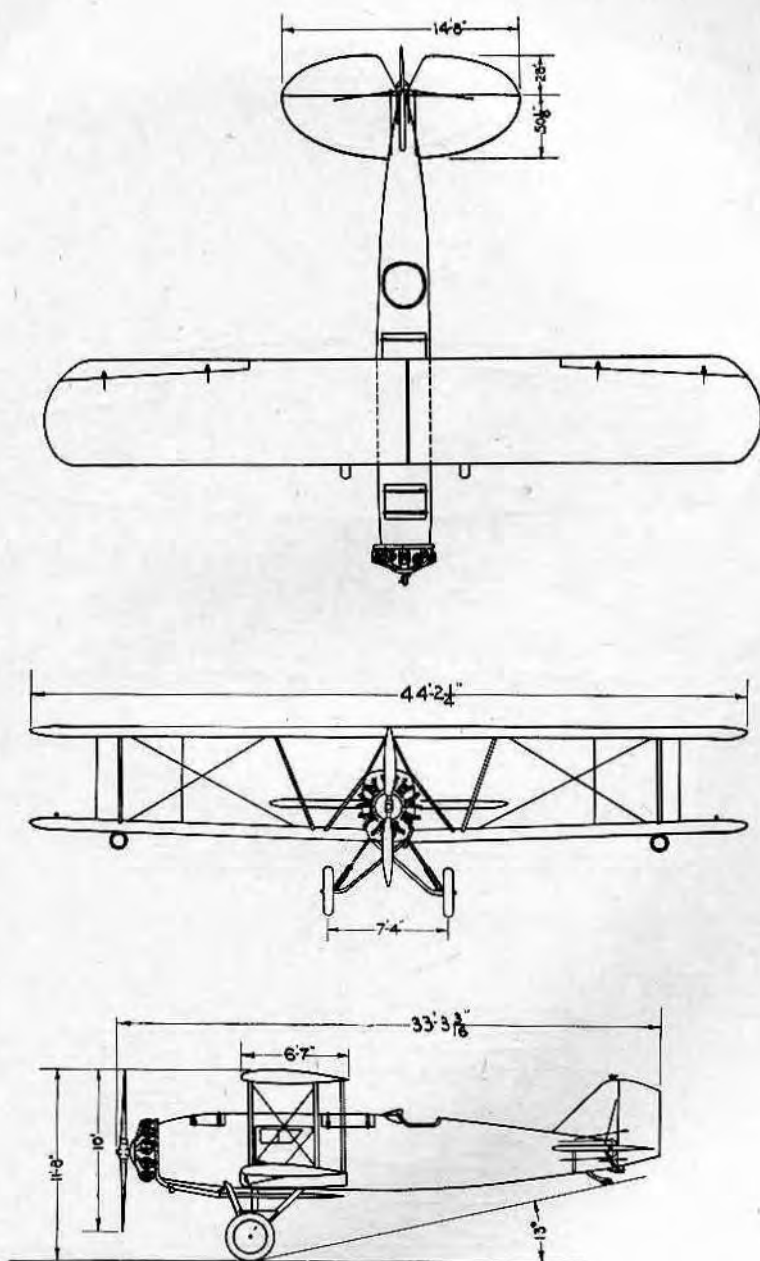
ENGINE—PACKARD 2A-1500



BOEING AIRPLANE COMPANY
SEATTLE, WASH.

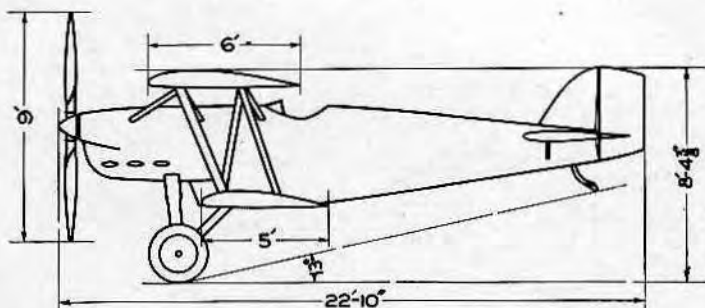
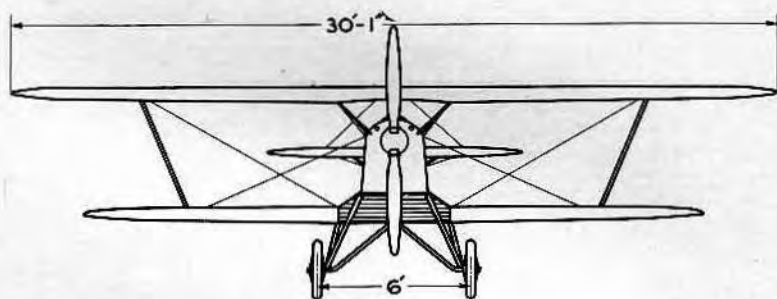
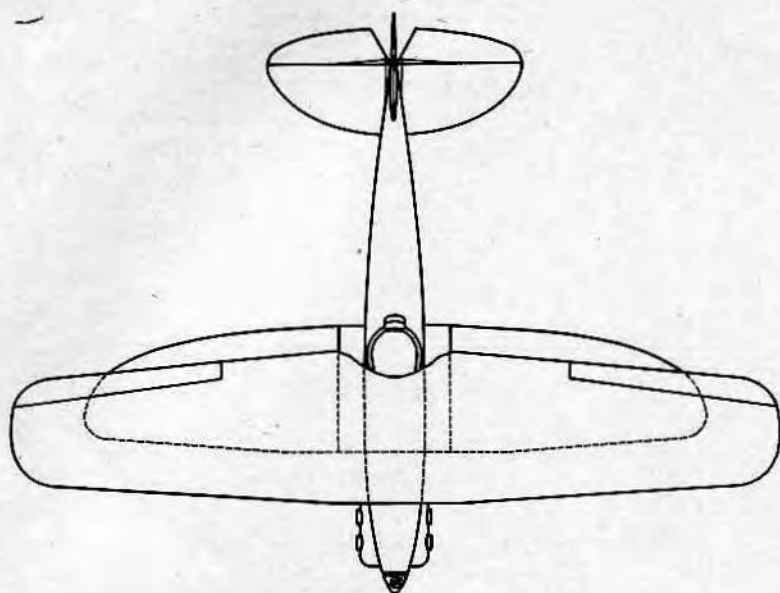
COMMERCIAL MODEL B-1D

ENGINES—WRIGHT "WHIRLWIND" OR PRATT & WHITNEY "WASP"



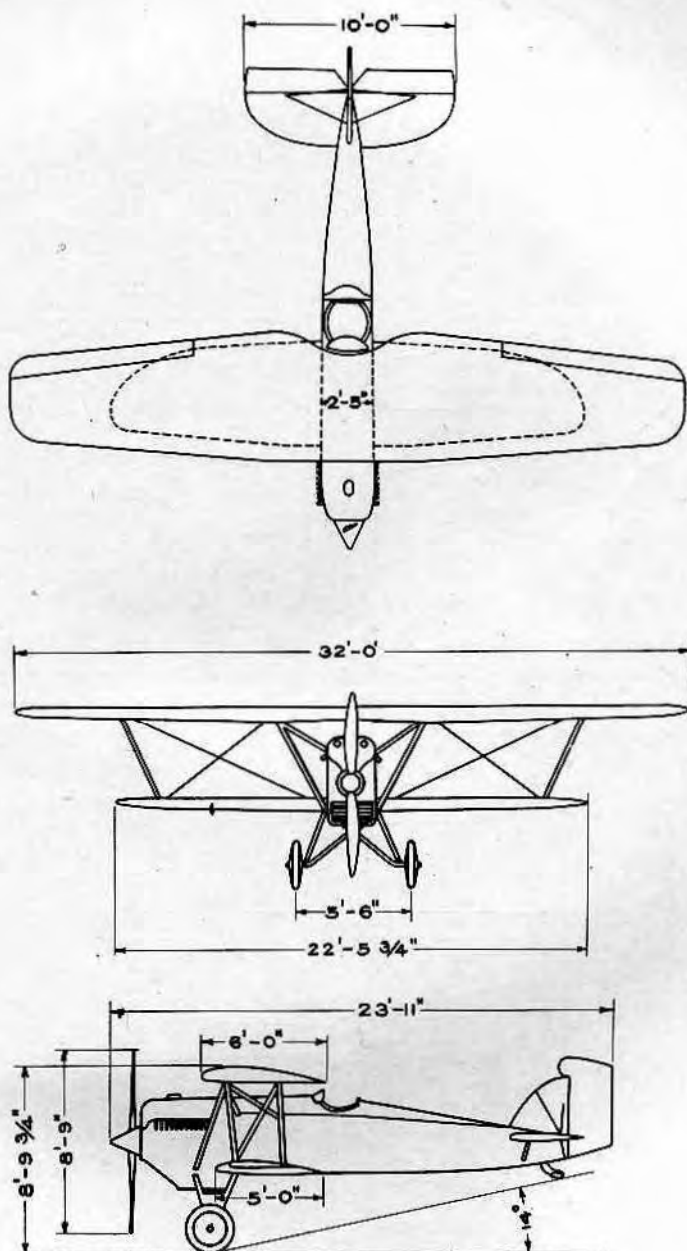
BOEING AIRPLANE COMPANY
SEATTLE, WASH.

MAIL PLANE 40A
ENGINE—PRATT & WHITNEY "WASP"



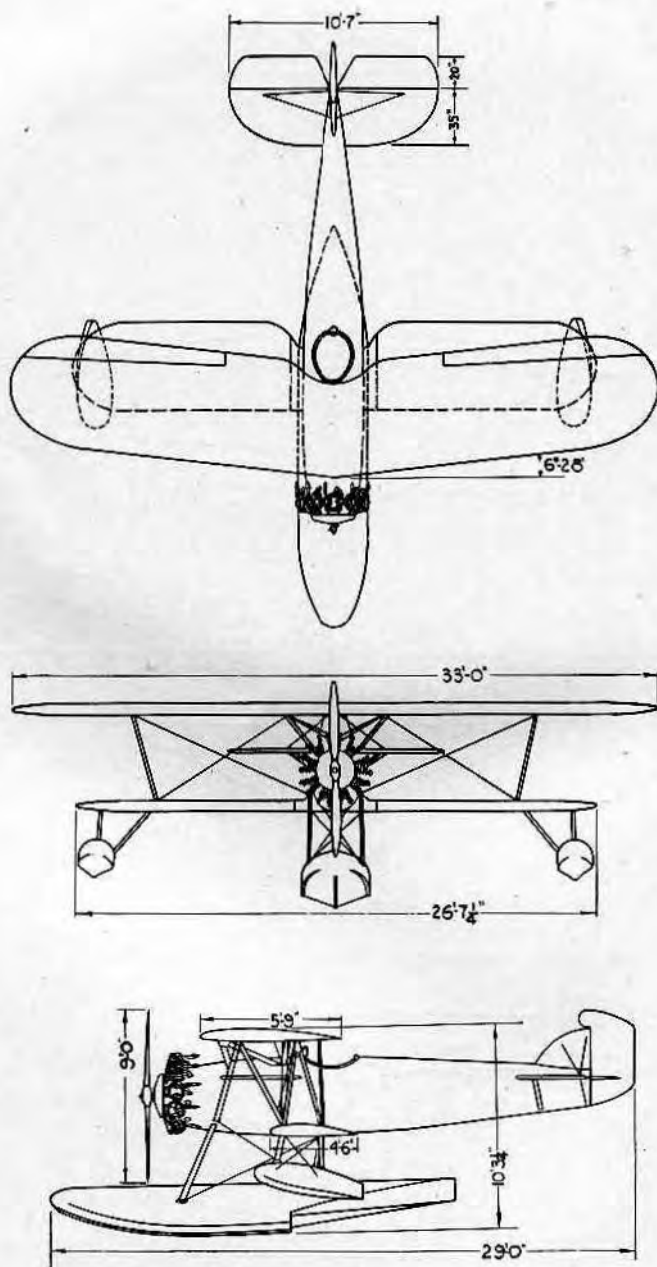
BOEING AIRPLANE COMPANY
SEATTLE, WASH.

PURSUIT MODEL 66
ENGINE—INVERTED PACKARD 2A-1500



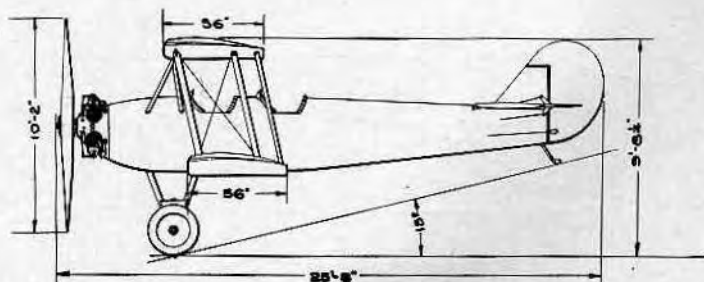
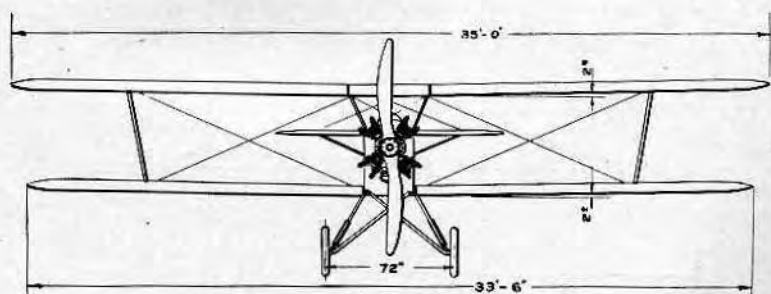
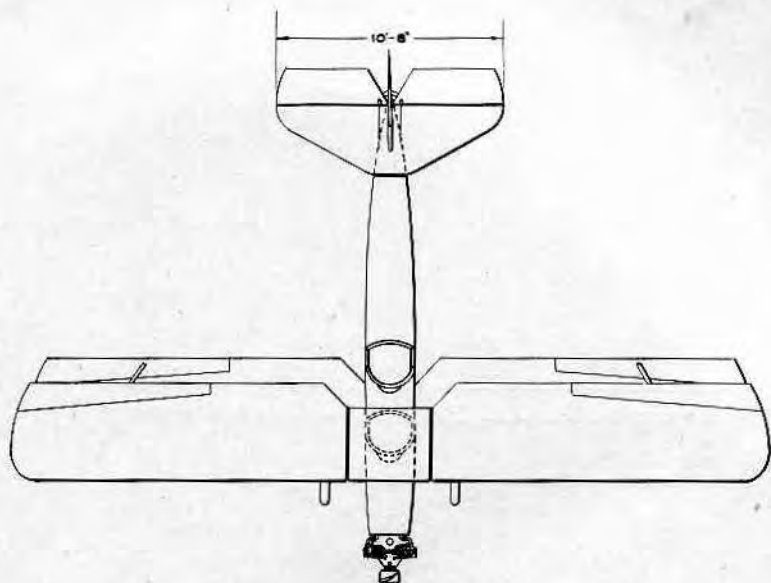
BOEING AIRPLANE COMPANY
SEATTLE, WASH.

PURSUIT MODEL PW-9D
ENGINE—CURTISS D.12-D

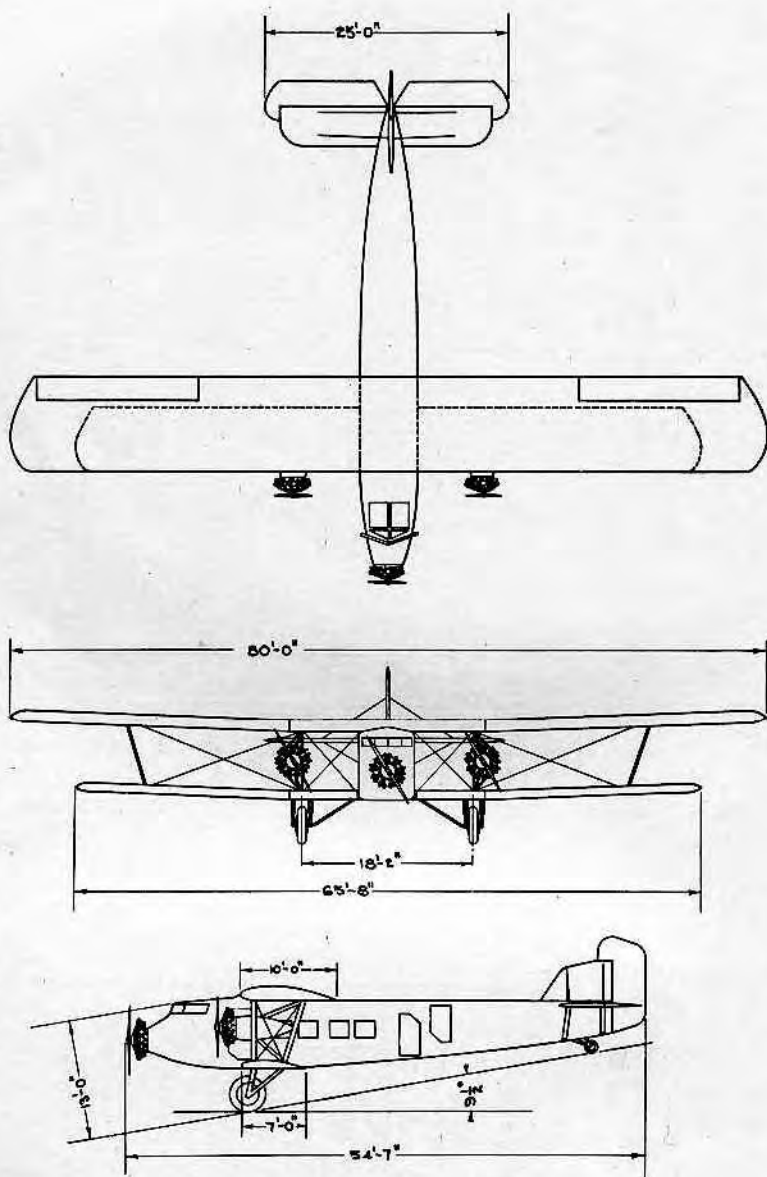


BOEING AIRPLANE COMPANY
SEATTLE, WASH.

SHIPBOARD FIGHTER F3B-1
ENGINE—PRATT & WHITNEY "WASP"



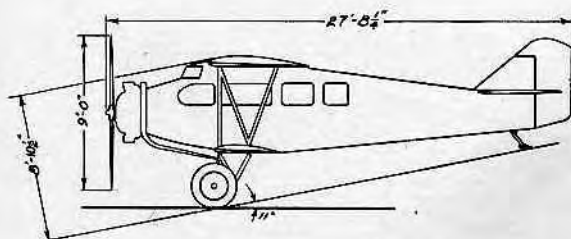
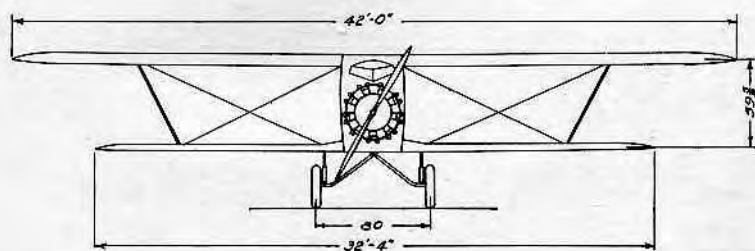
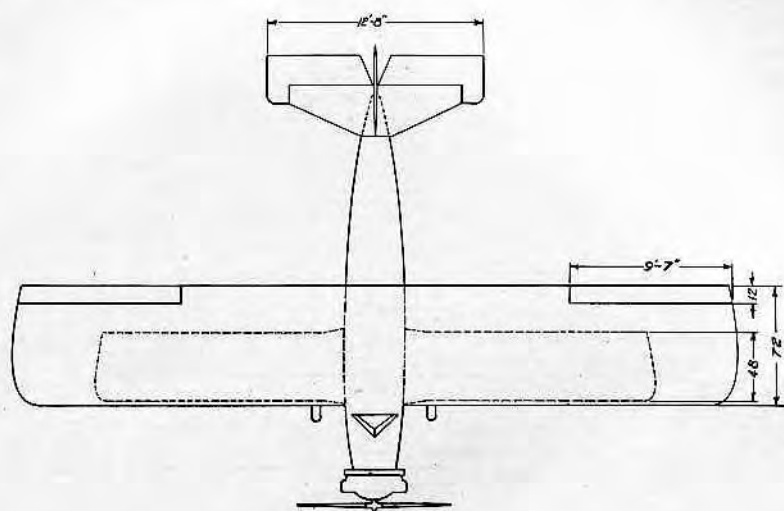
BOEING AIRPLANE COMPANY
SEATTLE, WASH.
SPORT AND TRAINING PLANE DES. 81
ENGINE—FAIRCHILD CAMINEZ



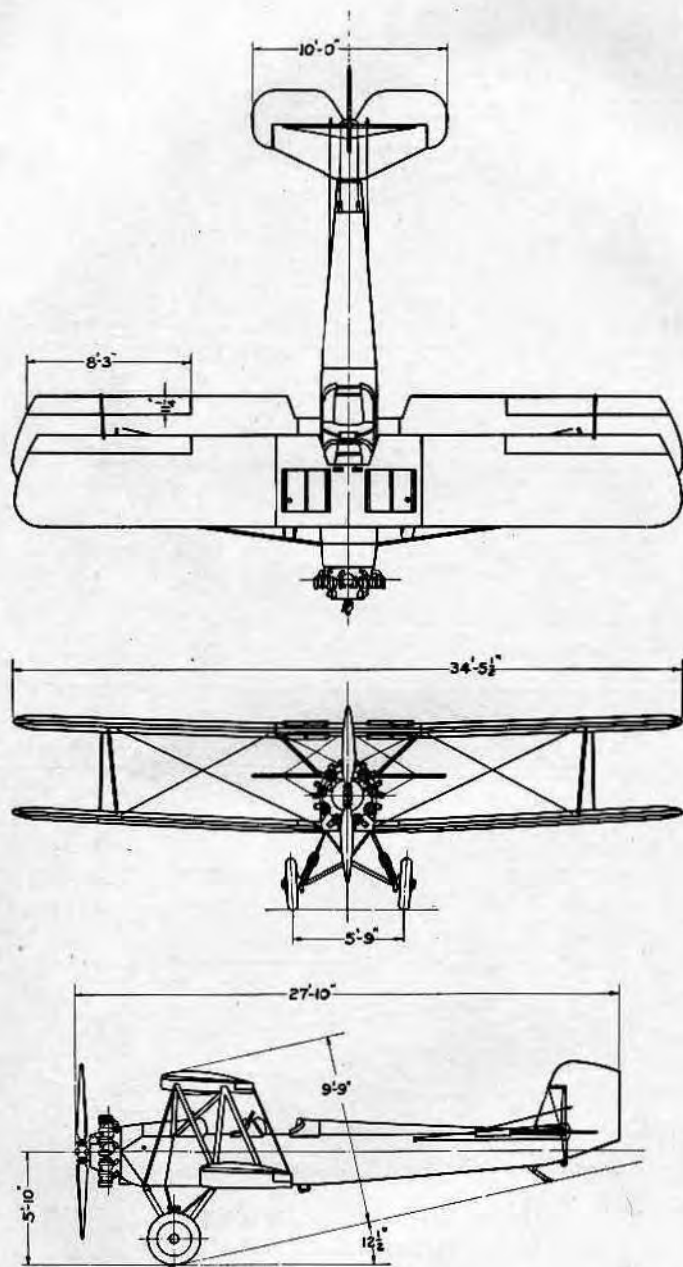
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SEATTLE, WASH.

TRANSPORT

ENGINE—PRATT & WHITNEY "WASP"

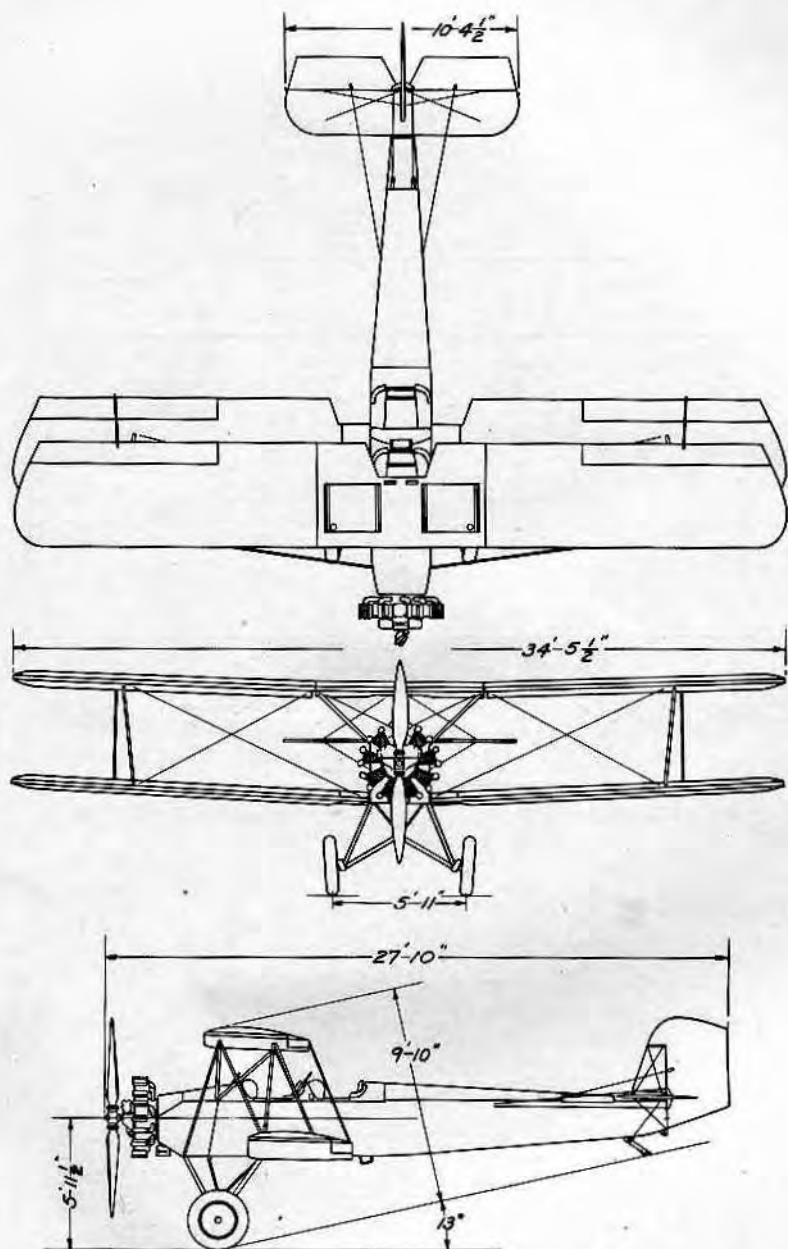


BUHL AIRCRAFT COMPANY
MARYSVILLE, MICH.
BUHL "AIRSEDAN" TYPE CA-5A
ENGINE—WRIGHT "WHIRLWIND"



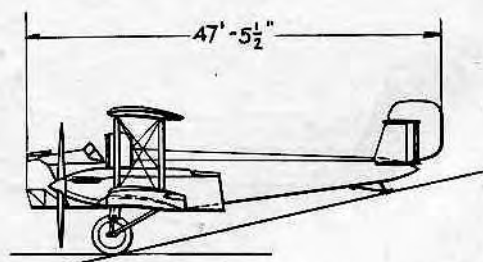
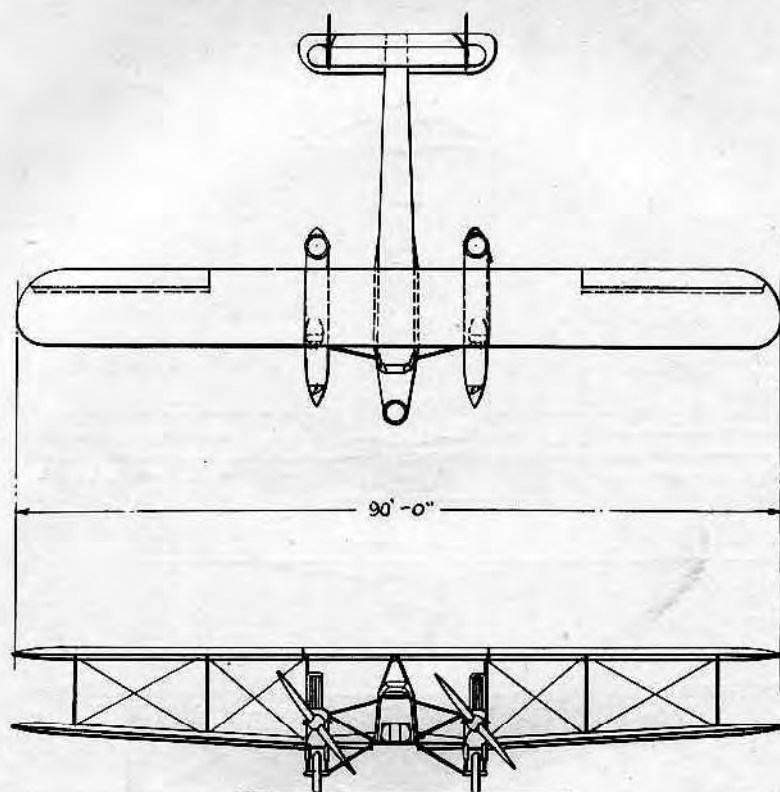
CONSOLIDATED AIRCRAFT CORPORATION
BUFFALO, N. Y.

CONSOLIDATED COURIER
ENGINE—WRIGHT "WHIRLWIND"



CONSOLIDATED AIRCRAFT CORPORATION
BUFFALO, N. Y.

CONSOLIDATED PT-3 (TRAINING PLANE)
ENGINE—WRIGHT "WHIRLWIND"

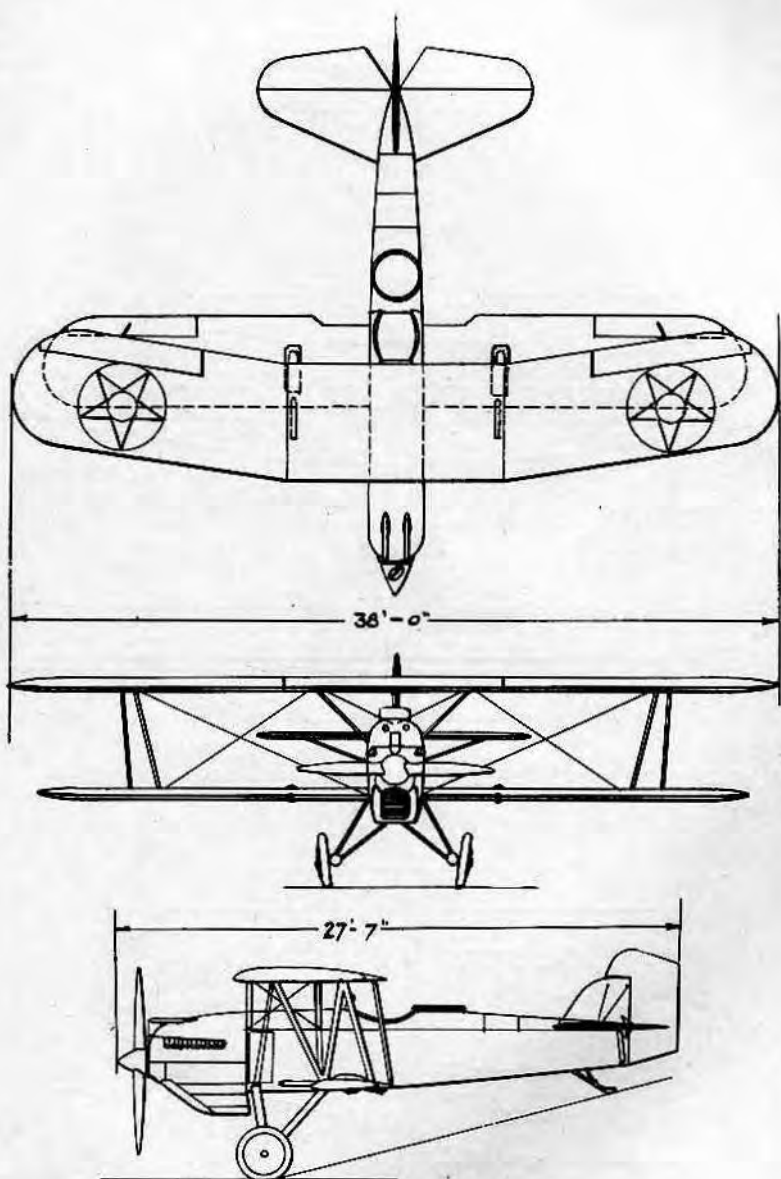


CURTISS AEROPLANE & MOTOR CO., INC.

GARDEN CITY, N. Y.

"CONDOR" BOMBER XB-2

ENGINE—CURTISS GEARED V-1550



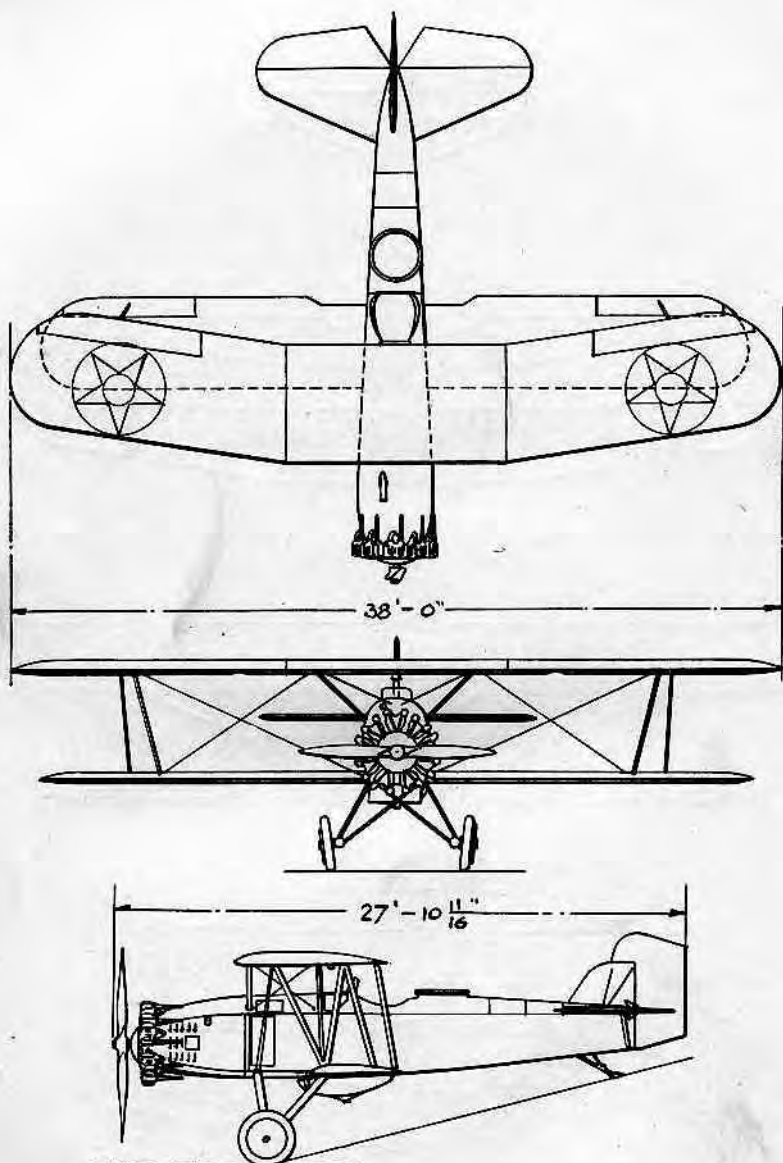
CURTISS AEROPLANE & MOTOR Co., INC.

GARDEN CITY, N. Y.

"FALCON" ATTACK PLANE A-3

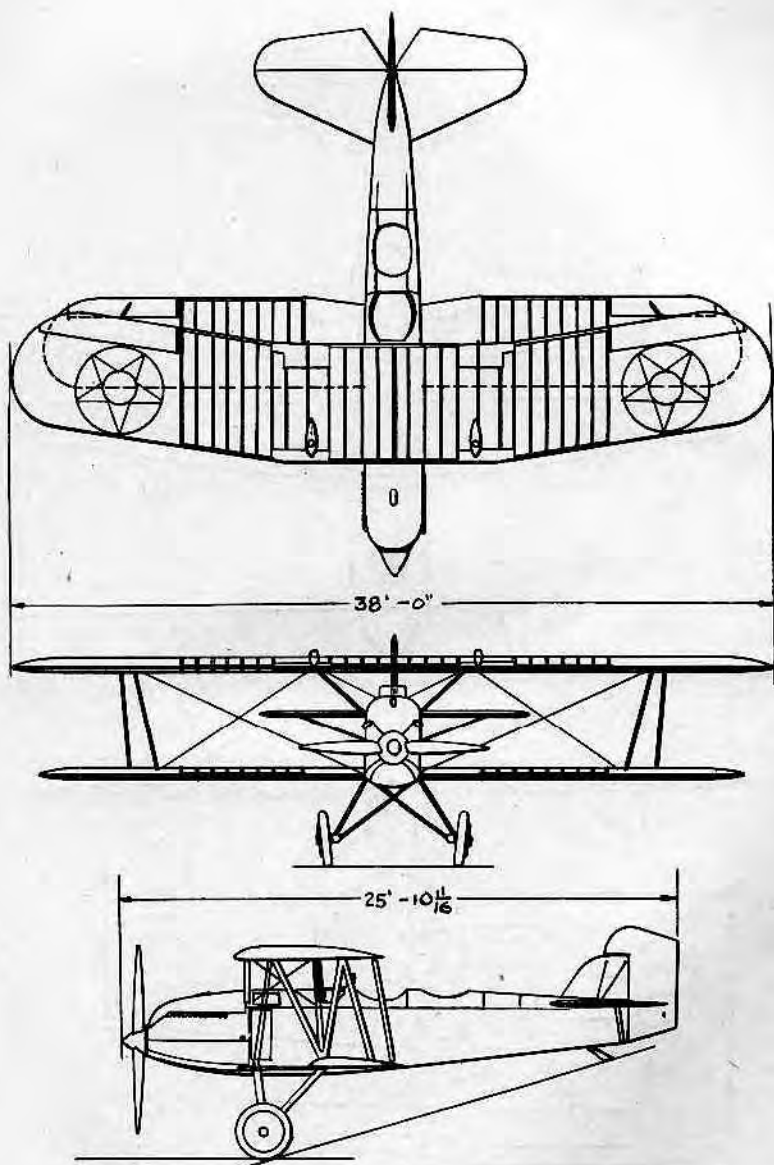
ENGINE—CURTISS D-12

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CURTISS AEROPLANE & MOTOR CO., INC.
GARDEN CITY, N. Y.

"FALCON" OBSERVATION PLANE OC-2
ENGINE—PRATT & WHITNEY "WASP"

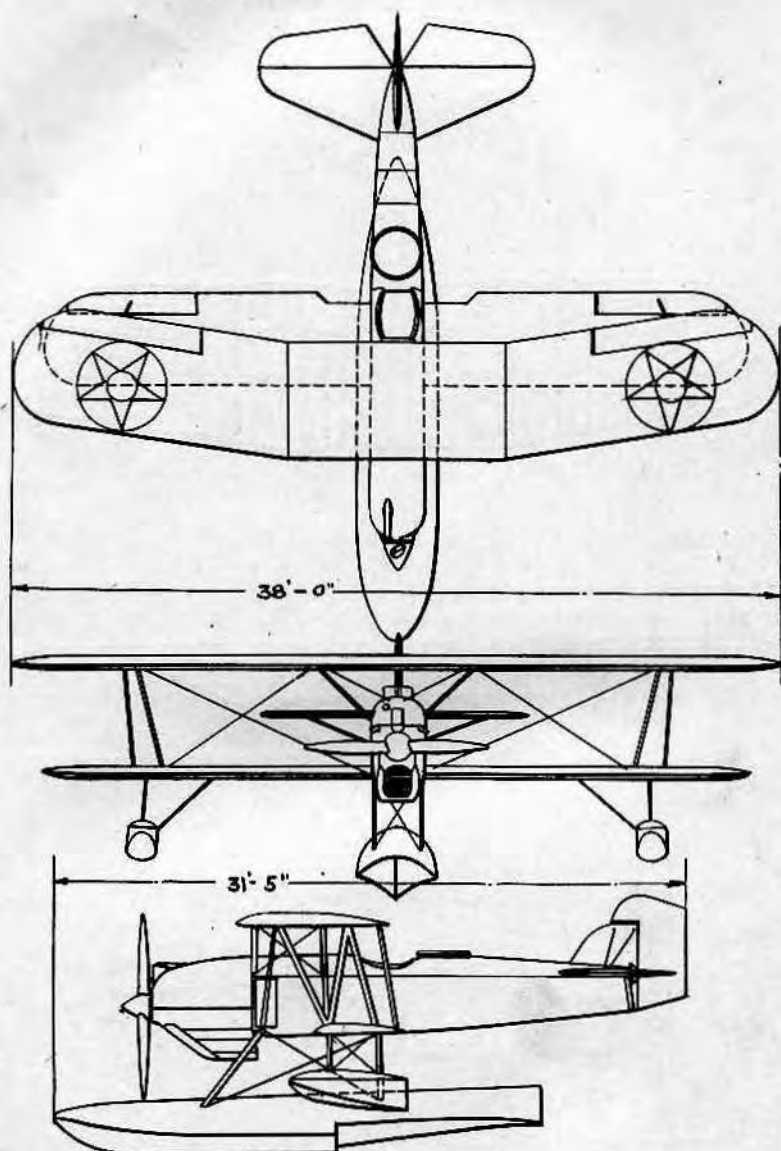


CURTISS AEROPLANE & MOTOR Co., INC.

GARDEN CITY, N. Y.

"FALCON" OBSERVATION XO-13A

ENGINE—CURTISS V-1550

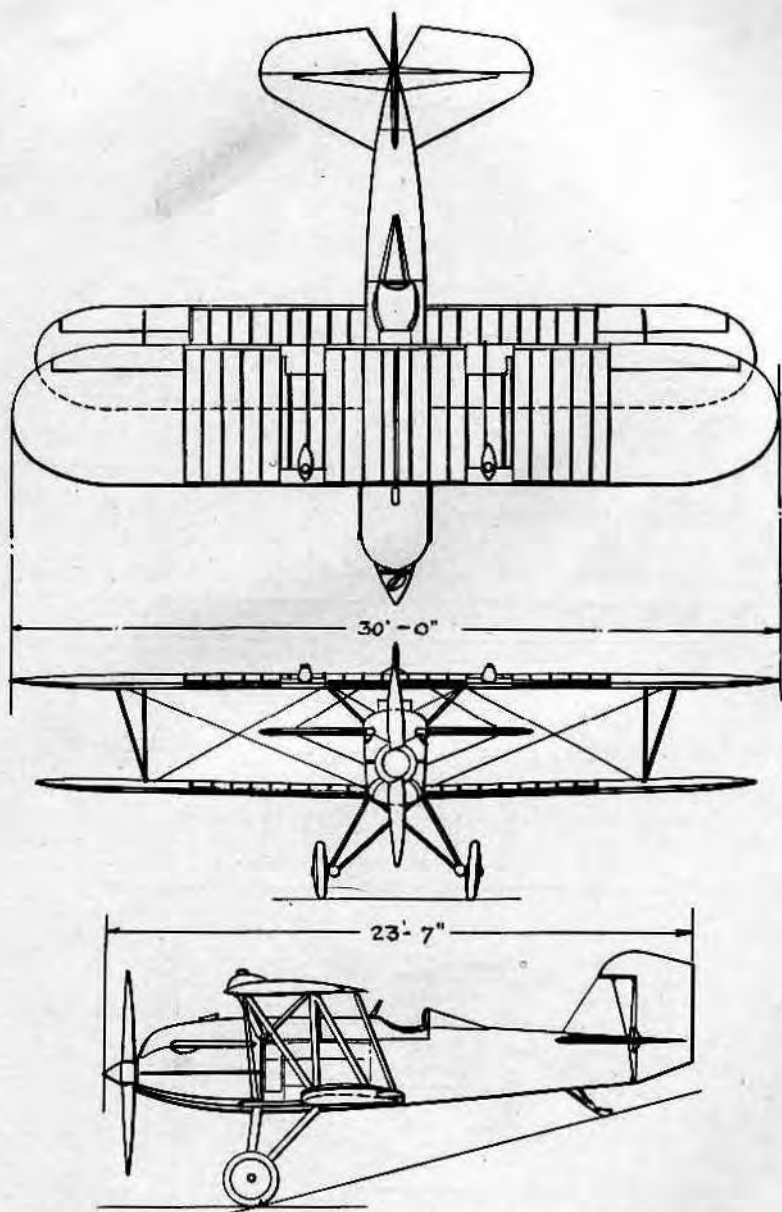


CURTISS AEROPLANE & MOTOR CO., INC.

GARDEN CITY, N. Y.

"FALCON" SEAPLANE

ENGINE—CURTISS D-12

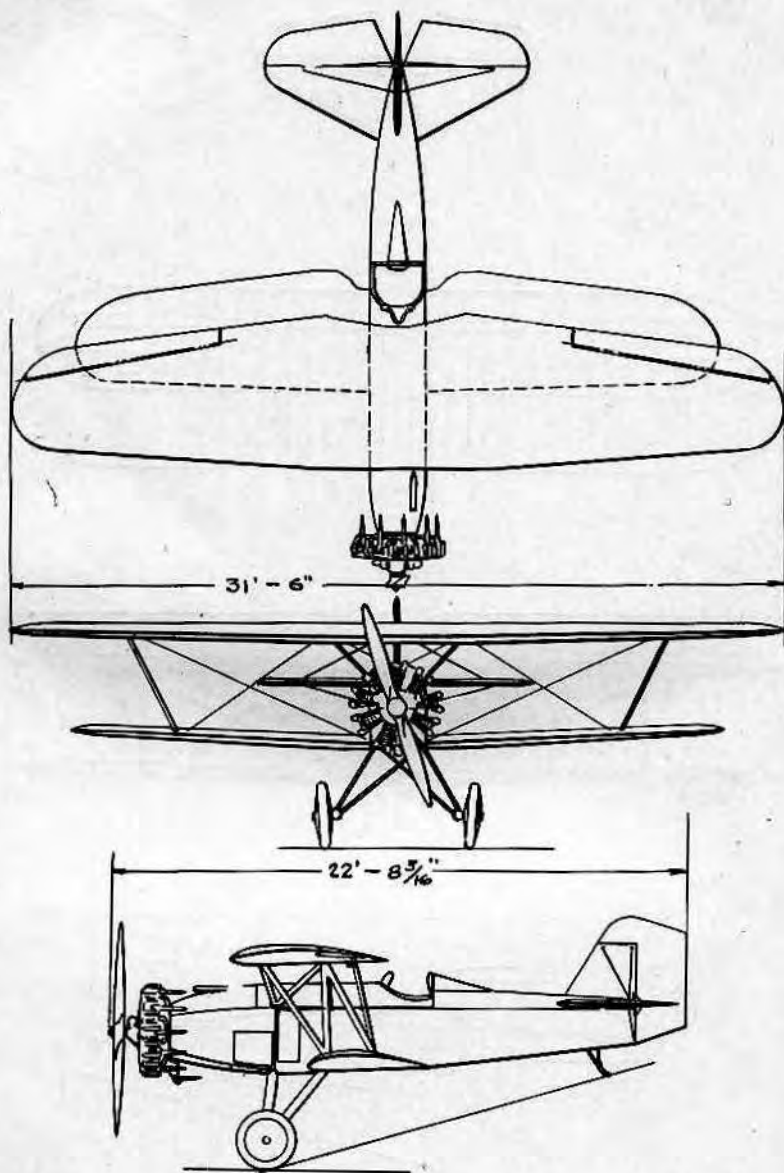


CURTISS AEROPLANE & MOTOR CO., INC.

GARDEN CITY, N. Y.

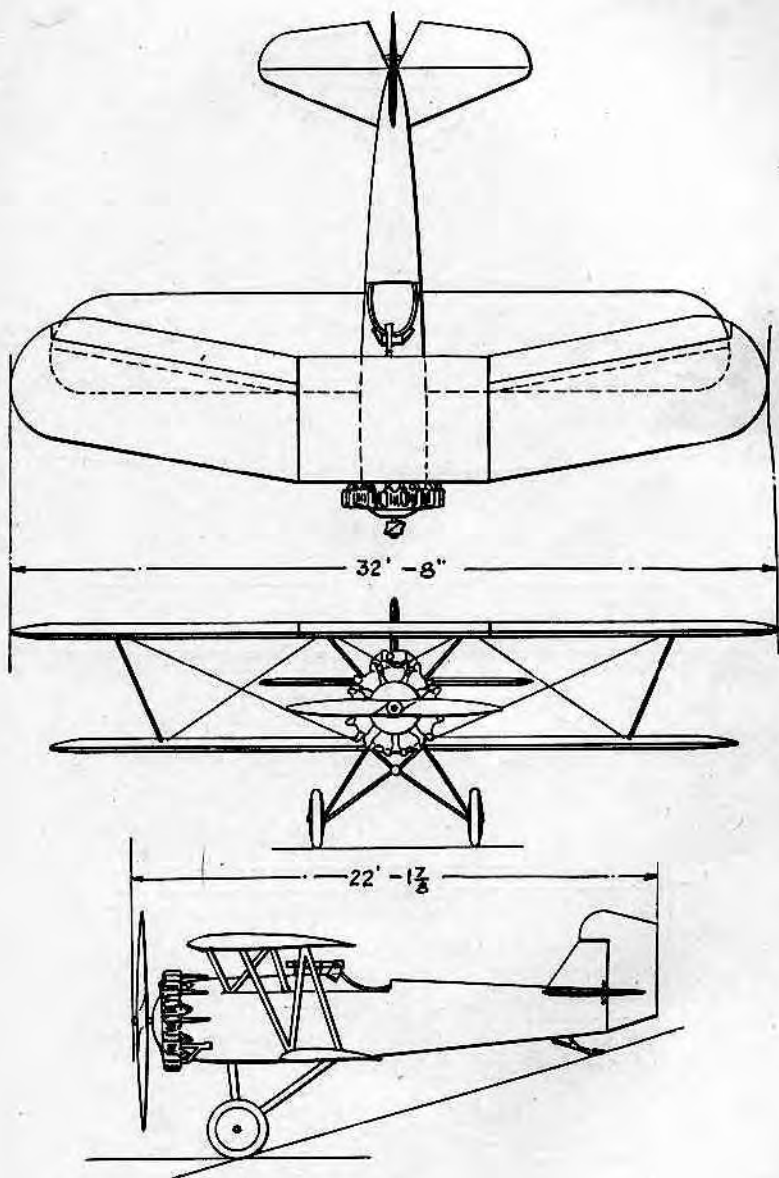
"HAWK" PURSUIT XP-6A

ENGINE—CURTISS V-1550



CURTISS AEROPLANE & MOTOR CO., INC.
GARDEN CITY, N. Y.

"HAWK" PURSUIT TRAINING PLANE AT-5
ENGINE—WRIGHT "WHIRLWIND"

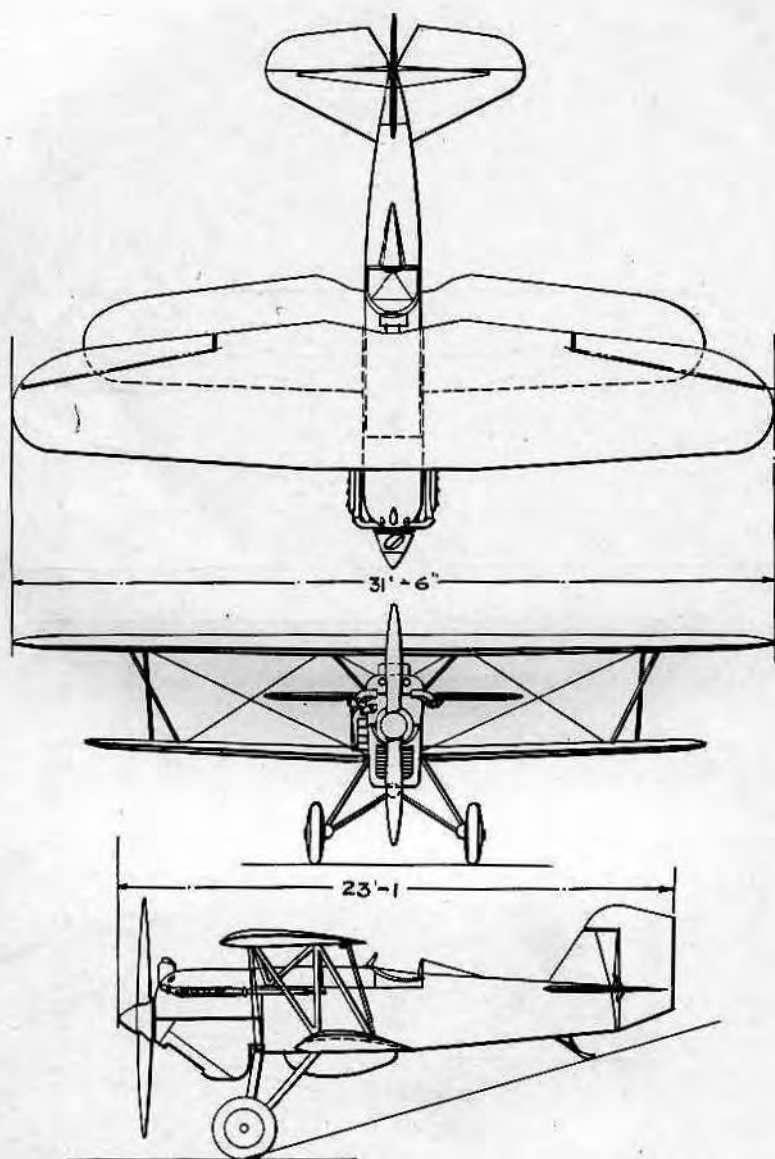


CURTISS AEROPLANE & MOTOR Co., INC.

GARDEN CITY, N. Y.

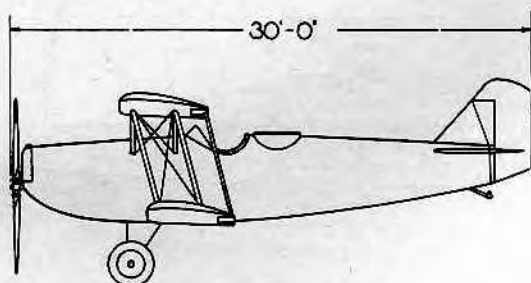
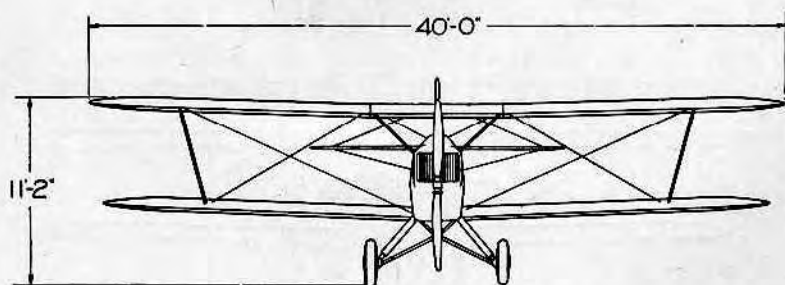
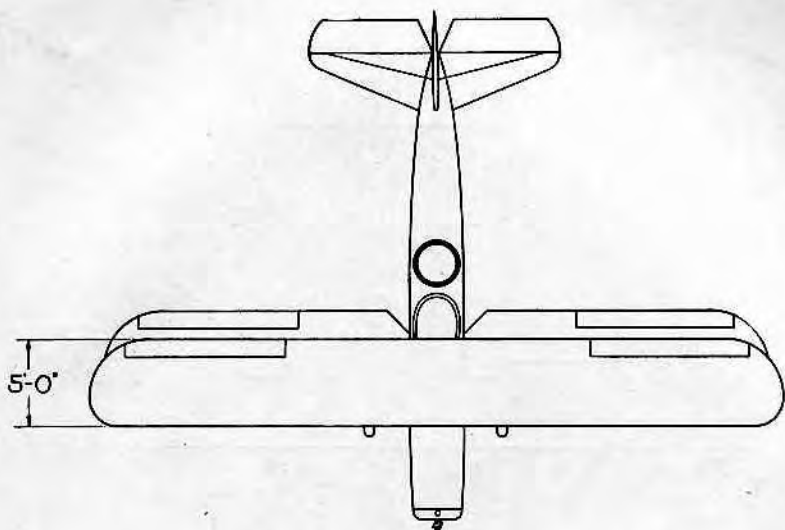
"SEA HAWK" SHIPBOARD FIGHTER F7C-1

ENGINE—PRATT & WHITNEY "WASP"

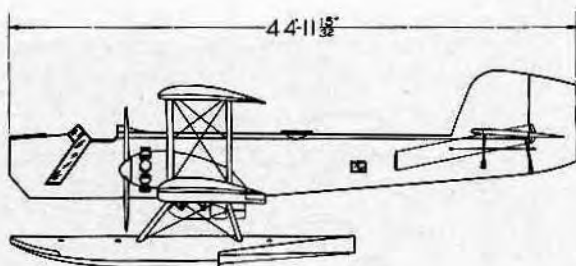
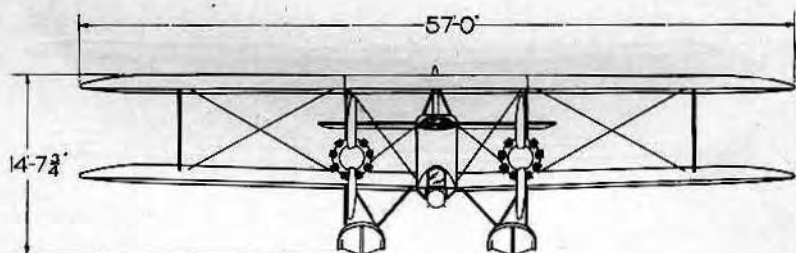
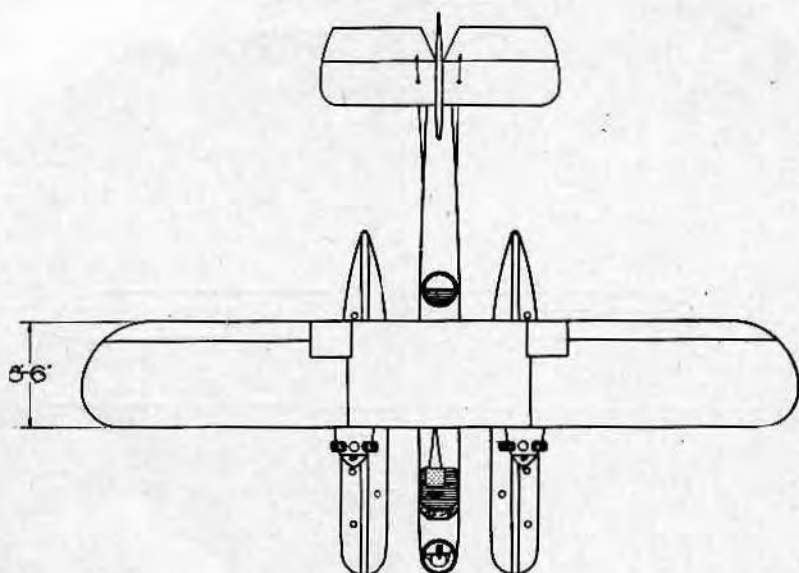


CURTISS AEROPLANE & MOTOR Co., INC.
GARDEN CITY, N. Y.

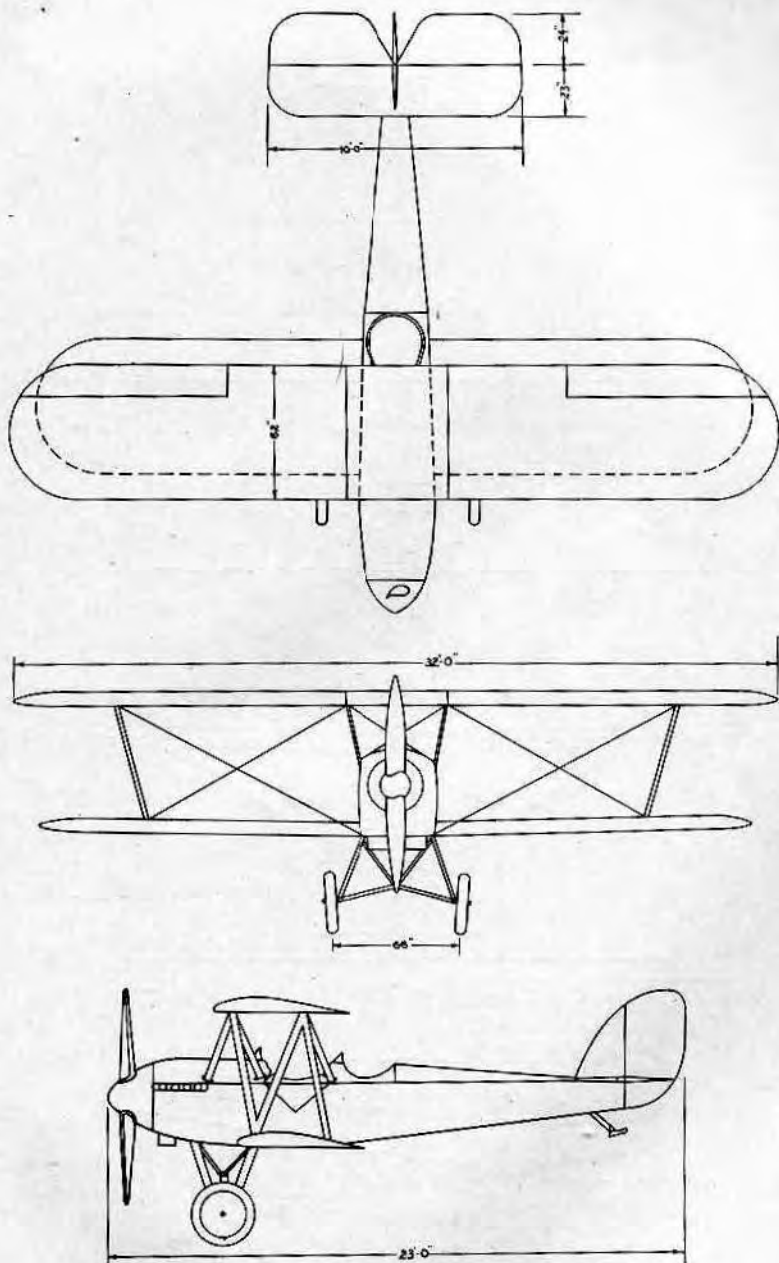
"SUPER HAWK" PURSUIT P-5
ENGINE—SUPERCHARGED CURTISS D-12



THE DOUGLAS COMPANY
 SANTA MONICA, CALIF.
ARMY OBSERVATION O-2H
 ENGINE—"LIBERTY"

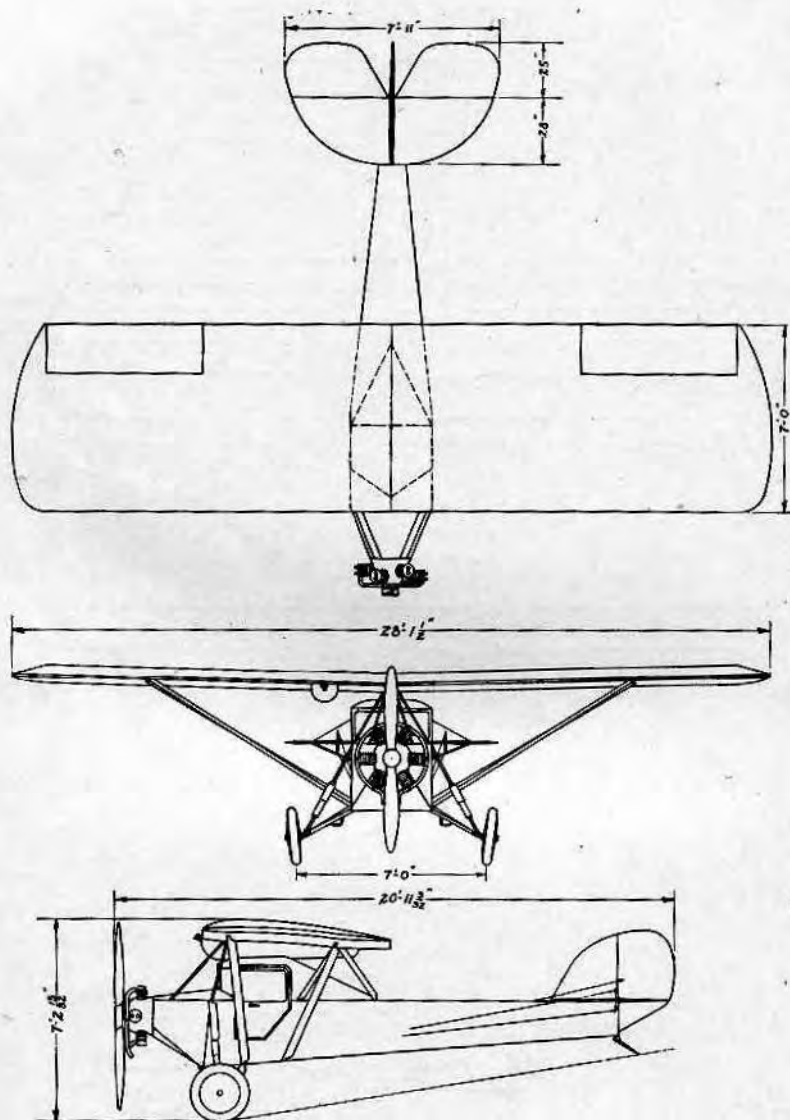


THE DOUGLAS COMPANY
 SANTA MONICA, CALIF.
NAVY THREE PURPOSE T2D-1
 ENGINES—WRIGHT "CYCLONE"



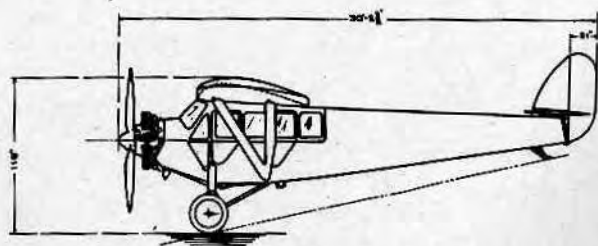
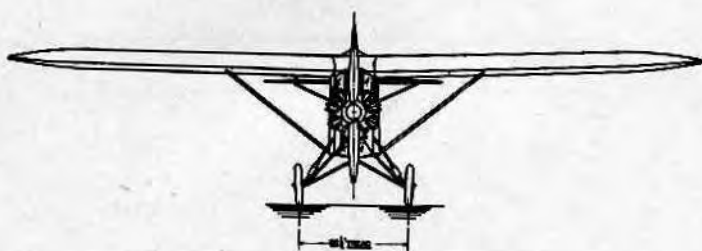
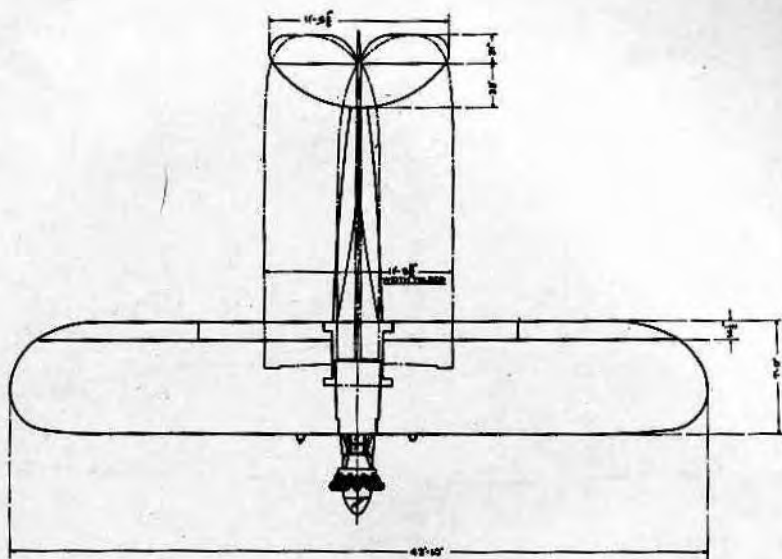
EBERHART AEROPLANE & MOTOR COMPANY
BUFFALO, N. Y.

"IROQUOIS" 3-PLACE COMMERCIAL
ENGINE—CURTISS OX-5



G. ELIAS & BRO., INC.
BUFFALO, N. Y.

"AIRCOUPE" 2-PLACE COMMERCIAL EC-1
ENGINE—ANZANI, 6A3 (OR) AIRCAT

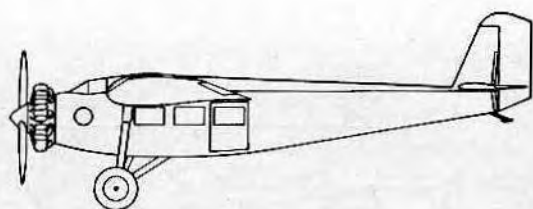
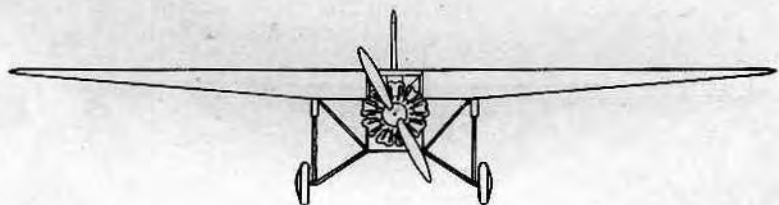
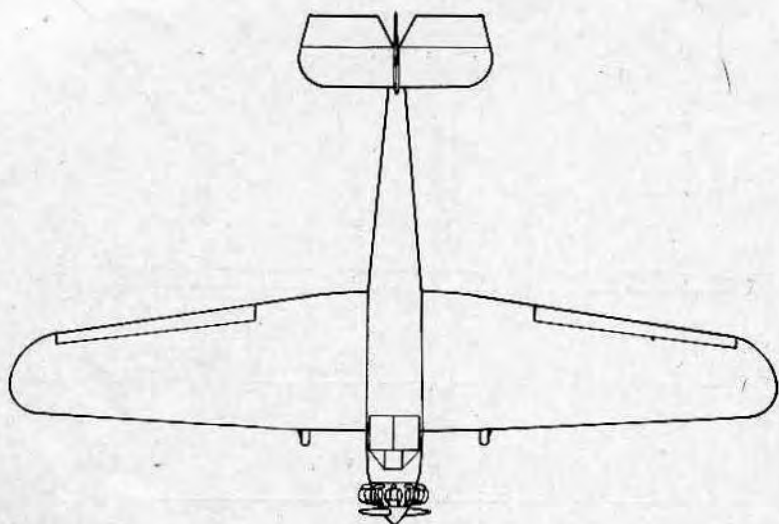


FAIRCHILD AIRPLANE MANUFACTURING CORP.

FARMINGDALE, L. I., N. Y.

CABIN MONOPLANE

ENGINE—WRIGHT "WHIRLWIND"



HAMILTON METALPLANE CO.

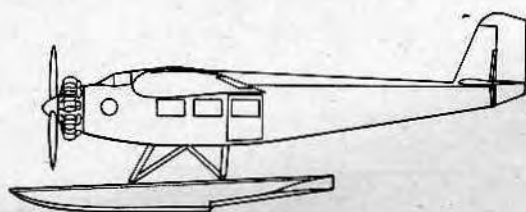
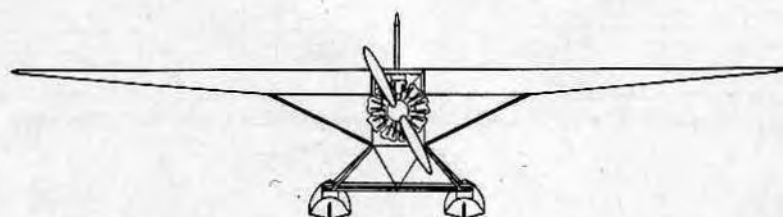
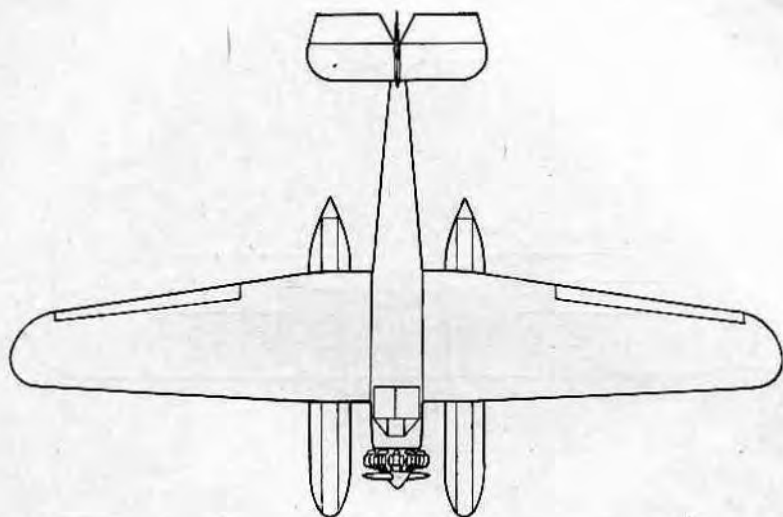
MILWAUKEE, WIS.

THE SILVER EAGLE

ENGINE--WRIGHT "WHIRLWIND"

THE SILVER STREAK

ENGINE--PRATT & WHITNEY "WASP"



HAMILTON METALPLANE CO.

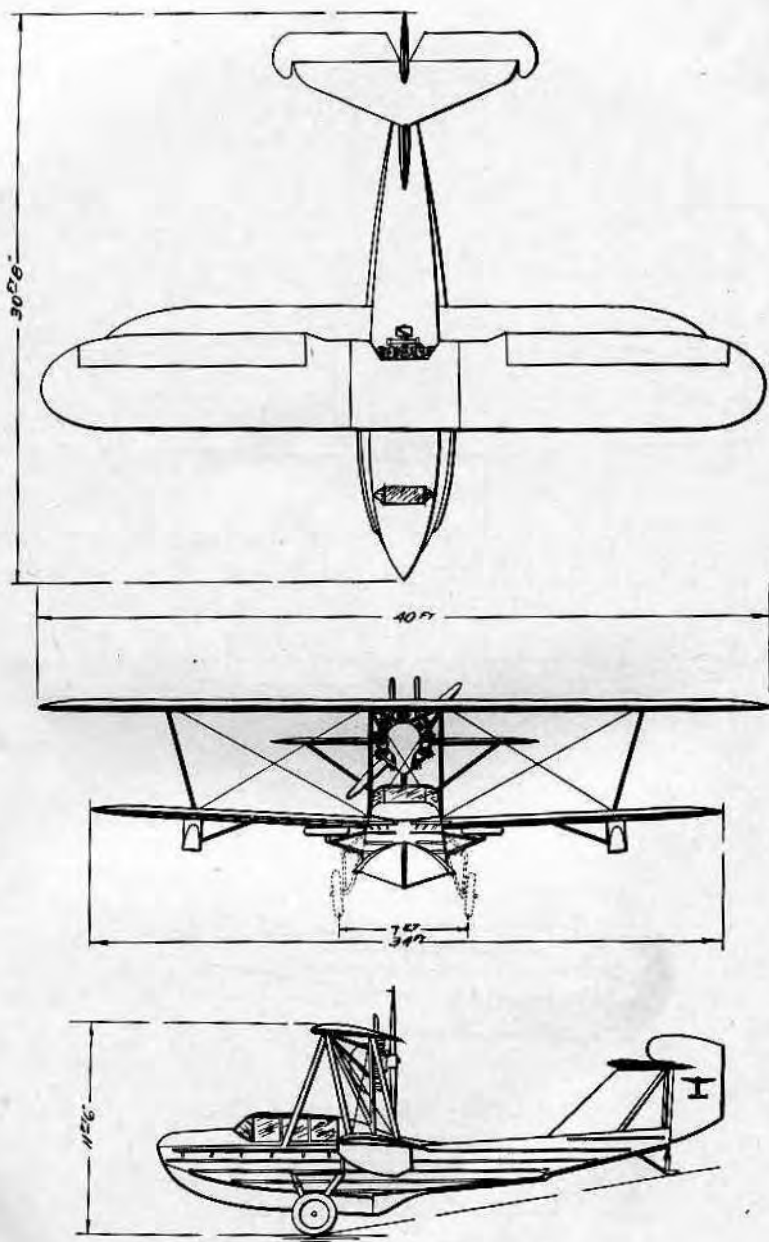
MILWAUKEE, WIS.

THE SILVER SWAN

ENGINE—WRIGHT "WHIRLWIND"

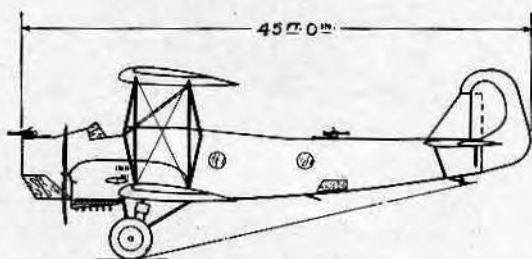
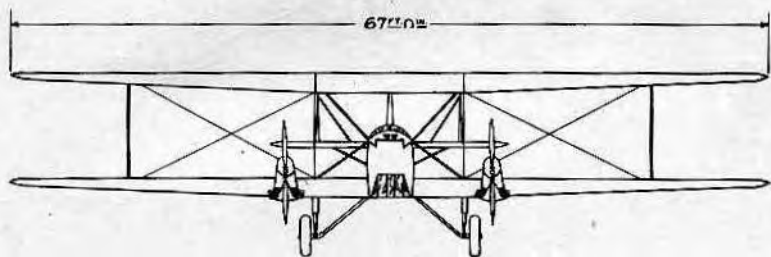
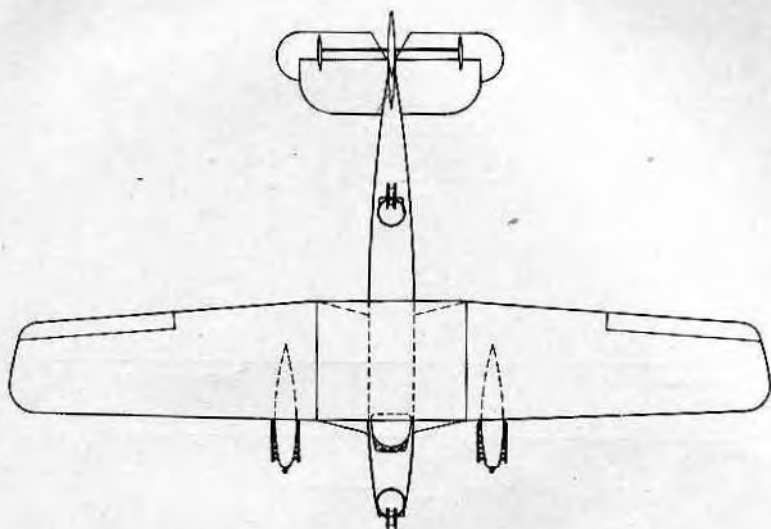
THE SILVER SEA-DAN

ENGINE--PRATT & WHITNEY "WASP"



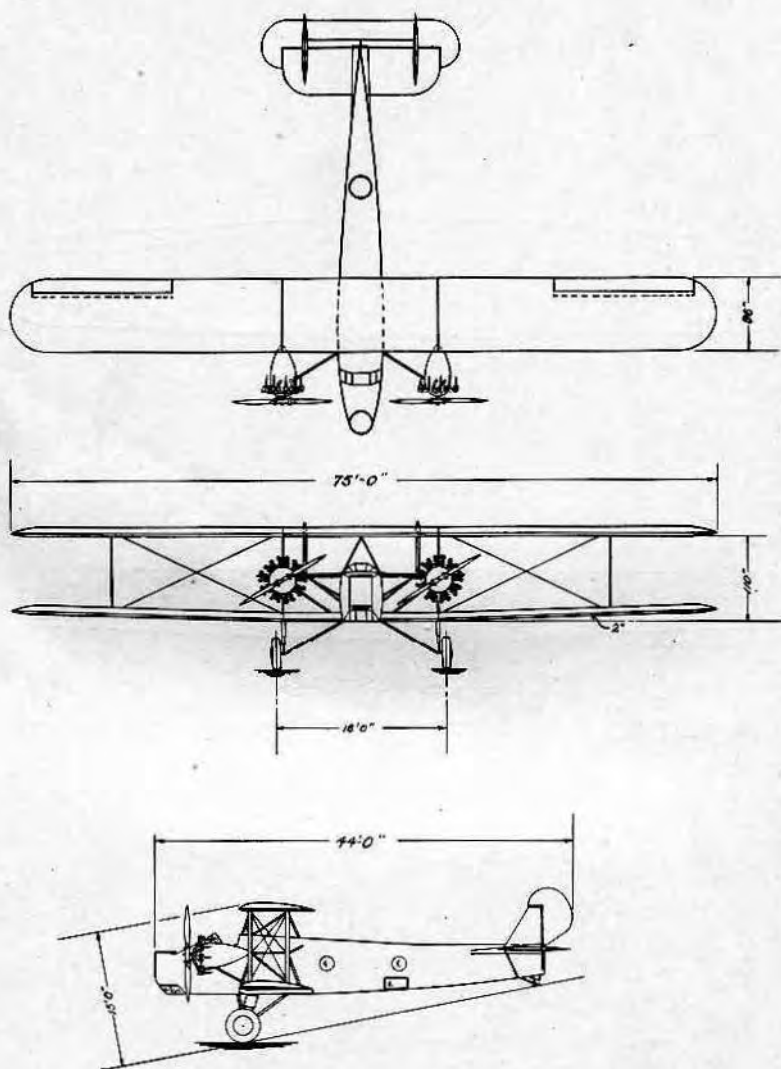
IRELAND AIRCRAFT, INC.
GARDEN CITY, N. Y.

"NEPTUNE" AMPHIBIAN FLYING BOAT
ENGINE—WRIGHT "WHIRLWIND"



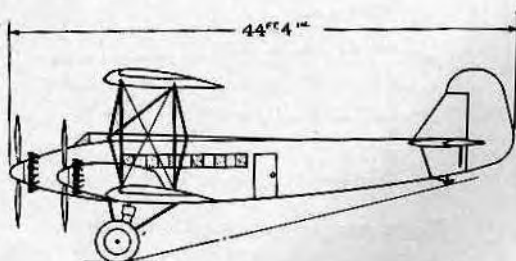
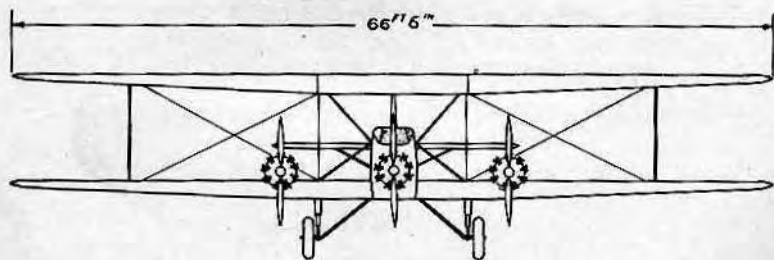
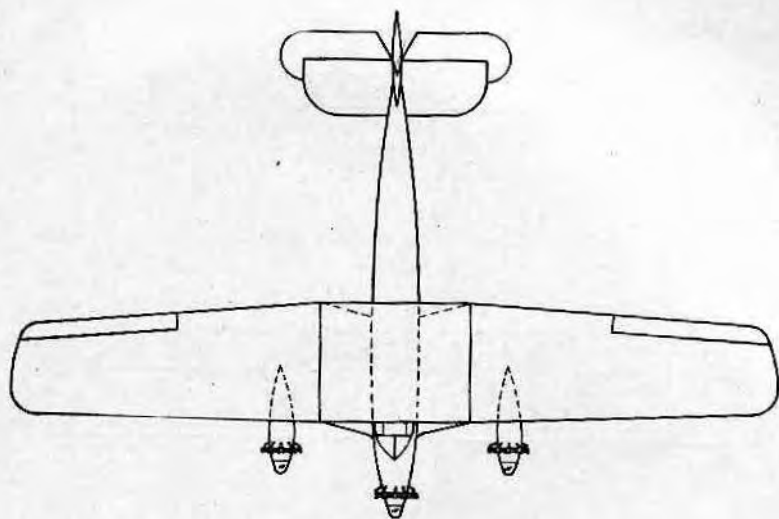
KEYSTONE AIRCRAFT CORP.
BRISTOL, PA.

LIGHT BOMBARDMENT AIRPLANE "XLB-3"
ENGINES—LIBERTY INVERTED AIR-COOLED



KEYSTONE AIRCRAFT CORP.
BRISTOL, PA.

"PANTHER" MODEL XLB-6 LIGHT BOMBARDMENT
ENGINES—WRIGHT "CYCLONE"

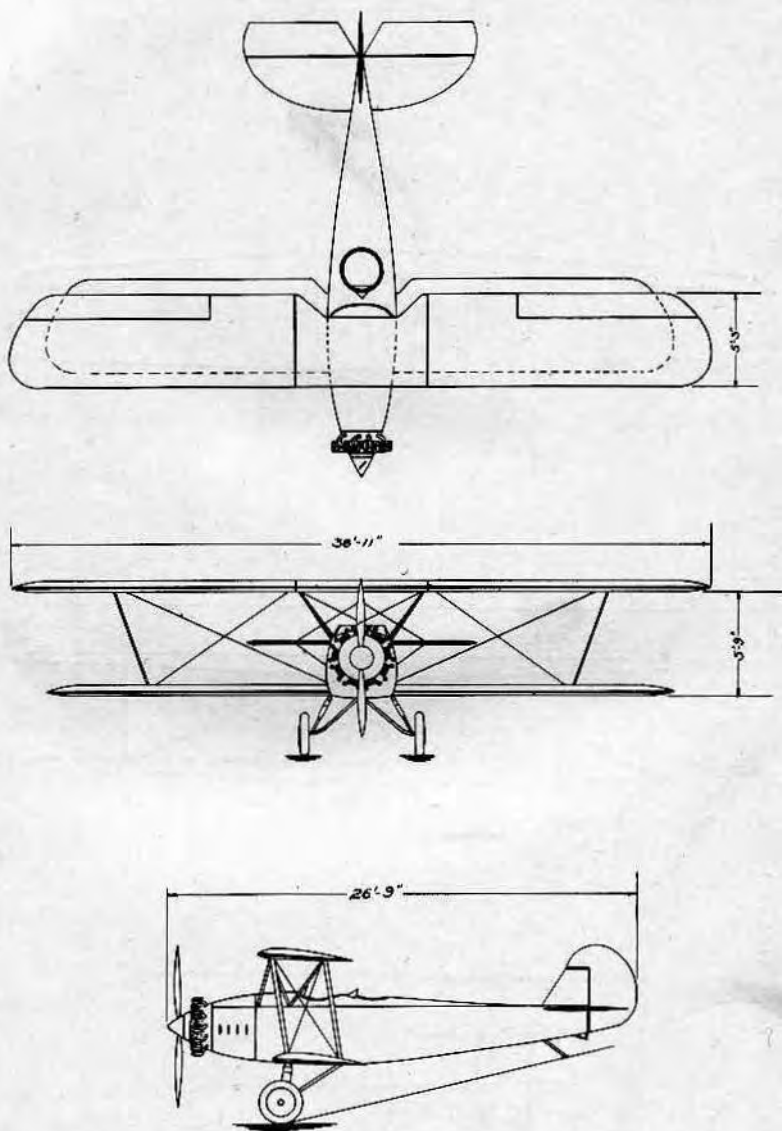


KEYSTONE AIRCRAFT CORP.

BRISTOL, PA.

"PATHFINDER"—TEN PASSENGER TRANSPORT

ENGINE—WRIGHT "WHIRLWIND"

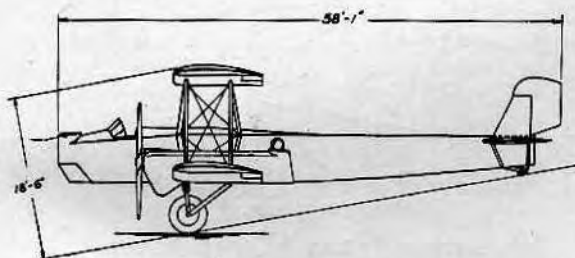
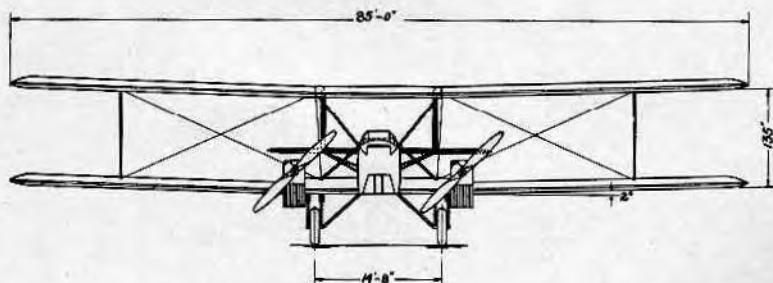
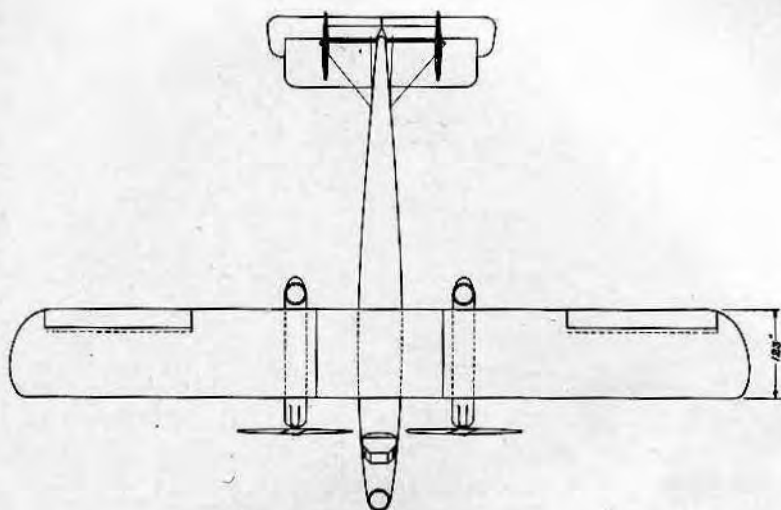


KEYSTONE AIRCRAFT CORP.

BRISTOL, PA.

"PRONTO" MODEL K-55

ENGINE—WRIGHT "WHIRLWIND"

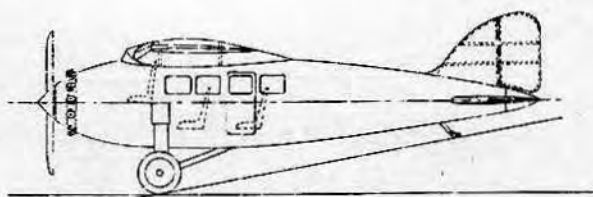
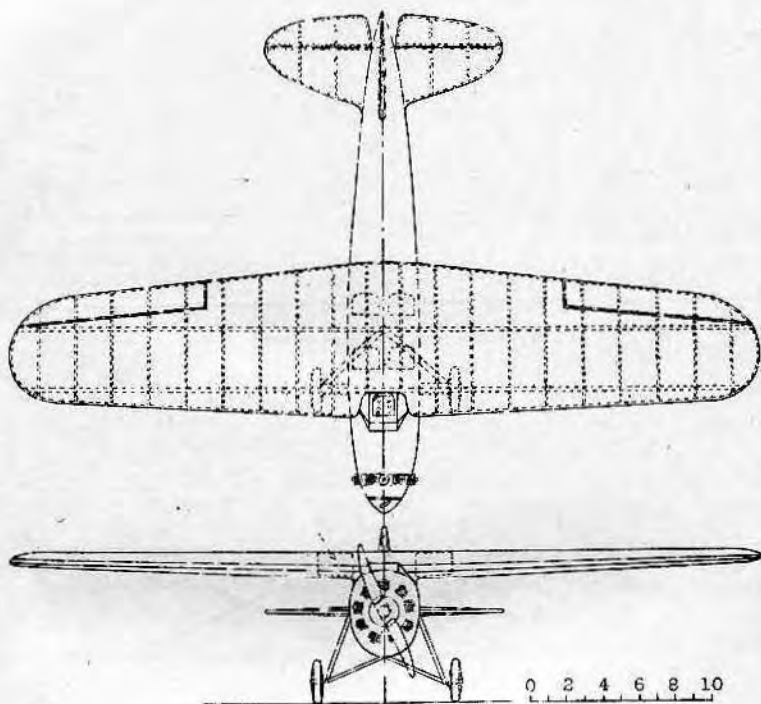


KEYSTONE AIRCRAFT CORP.

BRISTOL, PA.

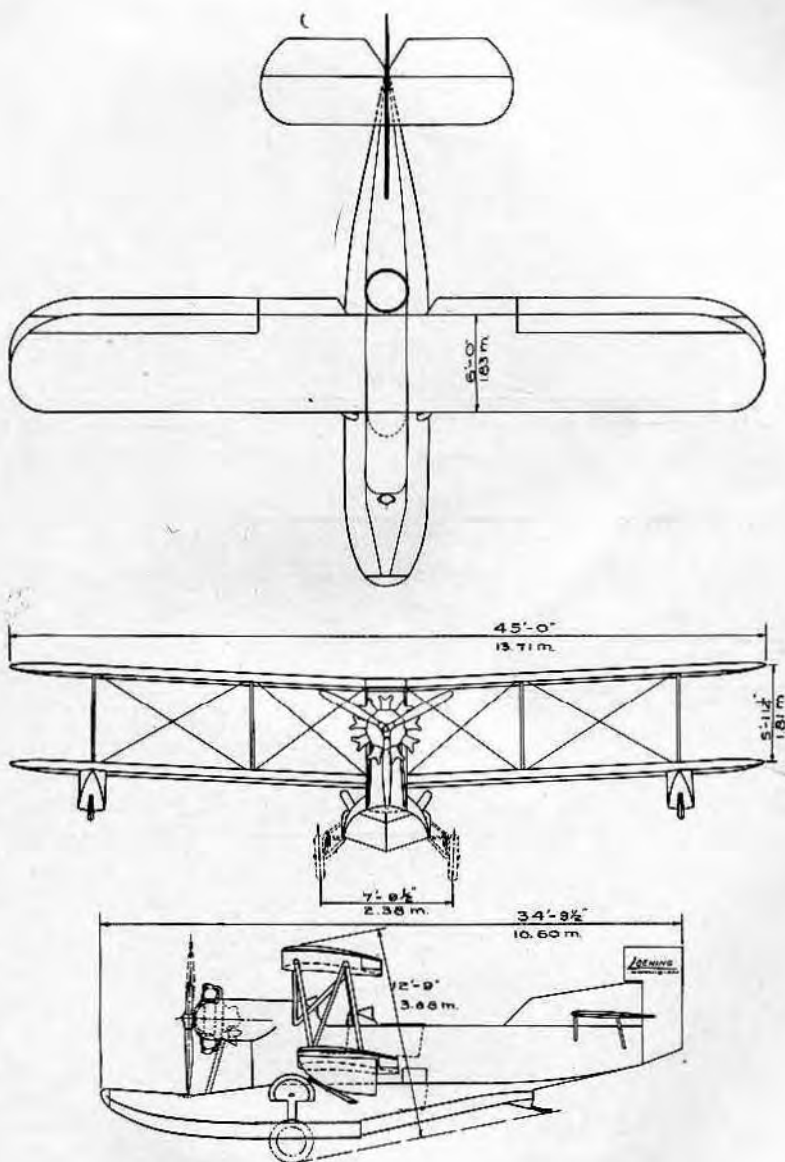
"SUPER-CYCLOPS" MODEL XB-1 HEAVY BOMBARDMENT

ENGINES—PACKARD 2A-1500 GEARED DRIVE



LOCKHEED AIRCRAFT COMPANY
BURBANK, CALIF.

LOCKHEED "VEGA" COMMERCIAL
ENGINE—WRIGHT "WHIRLWIND"

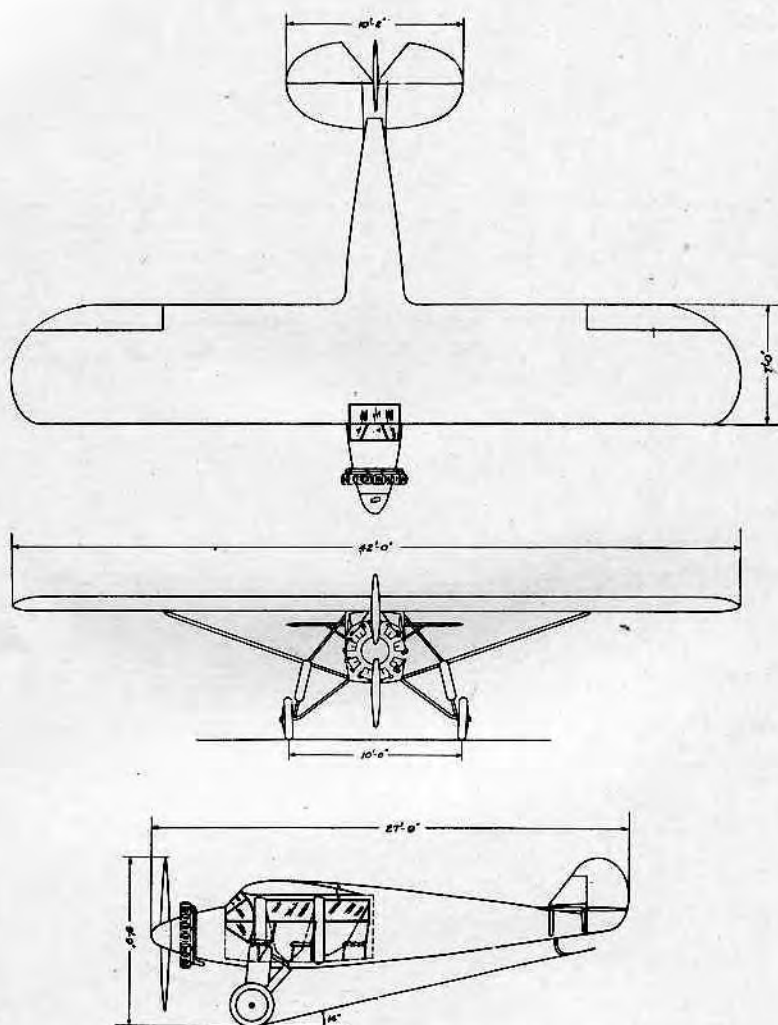


LOENING AERONAUTICAL ENGINEERING CORP.

NEW YORK, N. Y.

LOENING AMPHIBIAN

ENGINE—PRATT & WHITNEY "WASP"

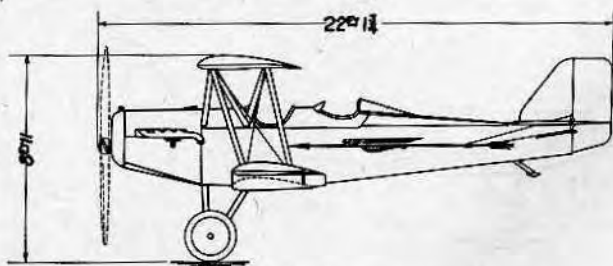
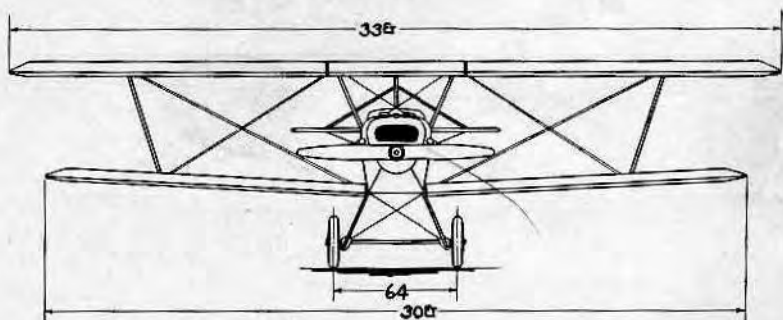
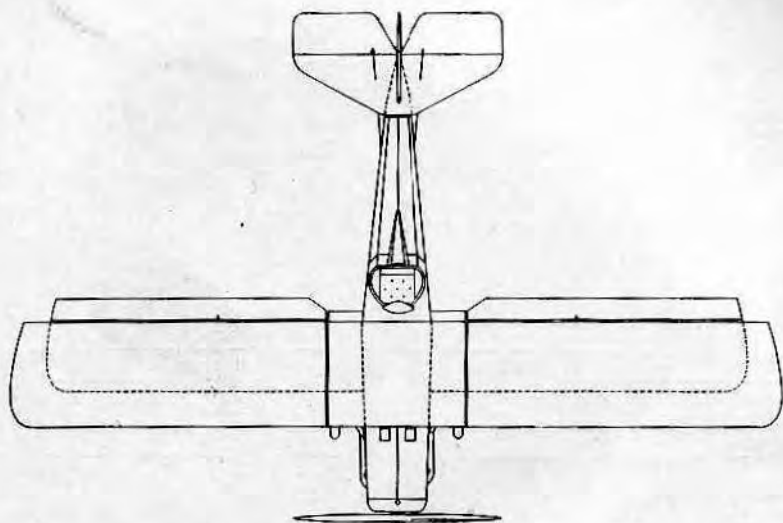


B. F. MAHONEY AIRCRAFT CORP.

SAN DIEGO, CALIF.

RYAN B-1 BROUGHAM

ENGINE—WRIGHT "WHIRLWIND"

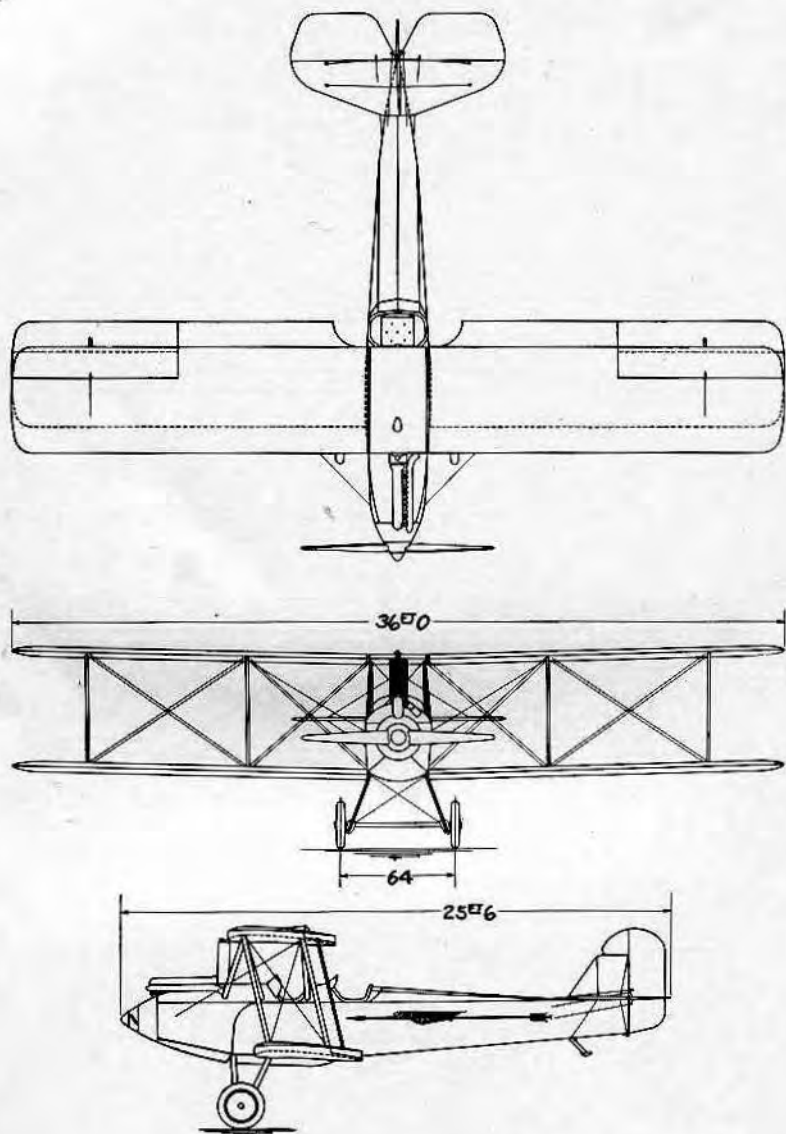


PITCAIRN AVIATION, INC.

PHILADELPHIA, PA.

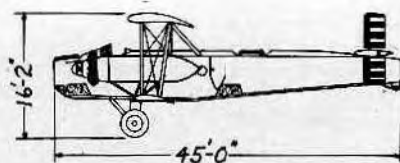
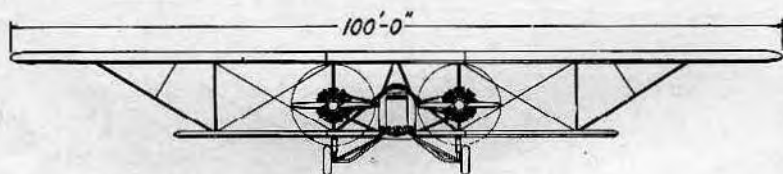
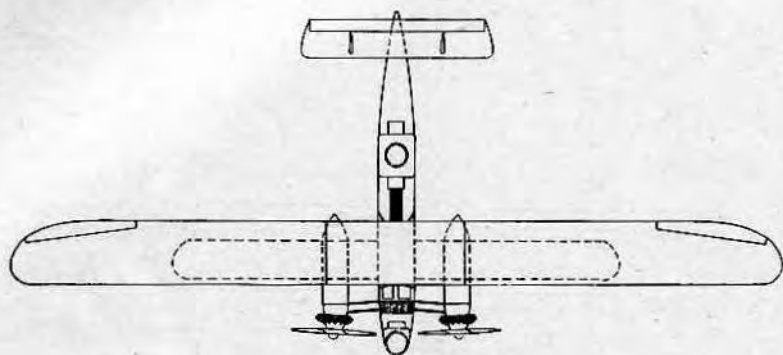
"FLEETWING" II—3-PLACE PASSENGER CARRIER

ENGINE—CURTISS OX-5

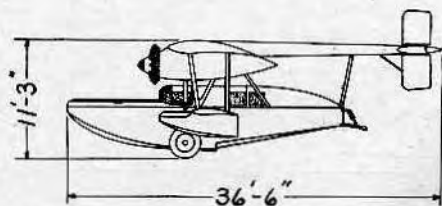
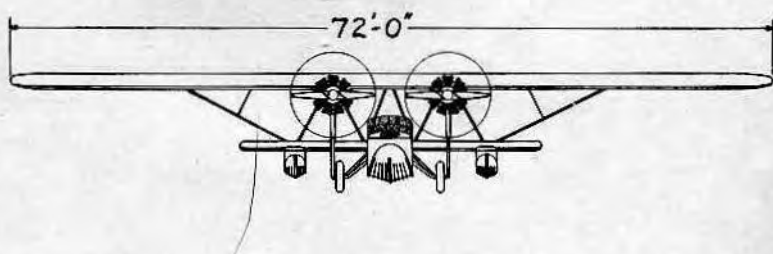
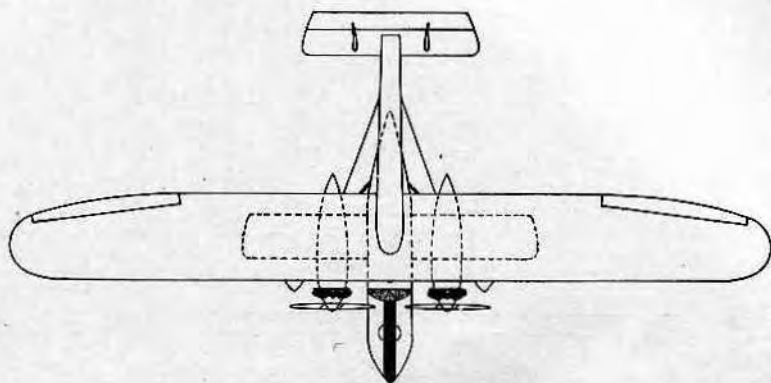


PITCAIRN AVIATION, INC.
PHILADELPHIA, PA.

"OROWING" II—3-PLACE PASSENGER CARRIER
ENGINE—CURTISS K-6



SIKORSKY MANUFACTURING CORP.
 COLLEGE POINT, N. Y.
"CONSOLIDATED SIKORSKY GUARDIAN"
 NIGHT BOMBER
 ENGINES—PRATT & WHITNEY "HORNET"

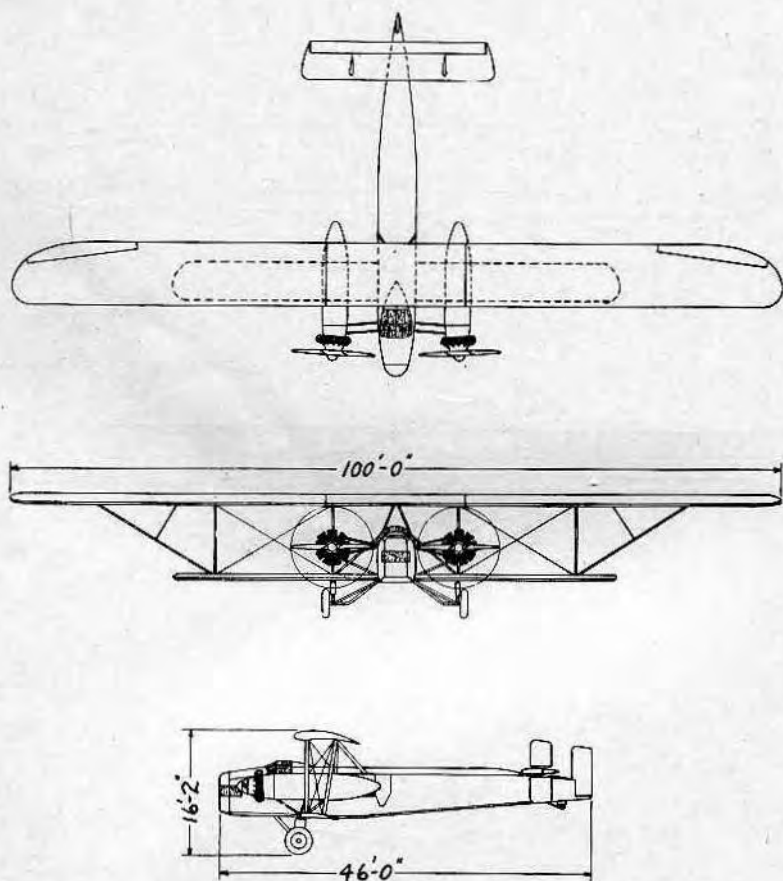


SIKORSKY MANUFACTURING CORP.

COLLEGE POINT, N. Y.

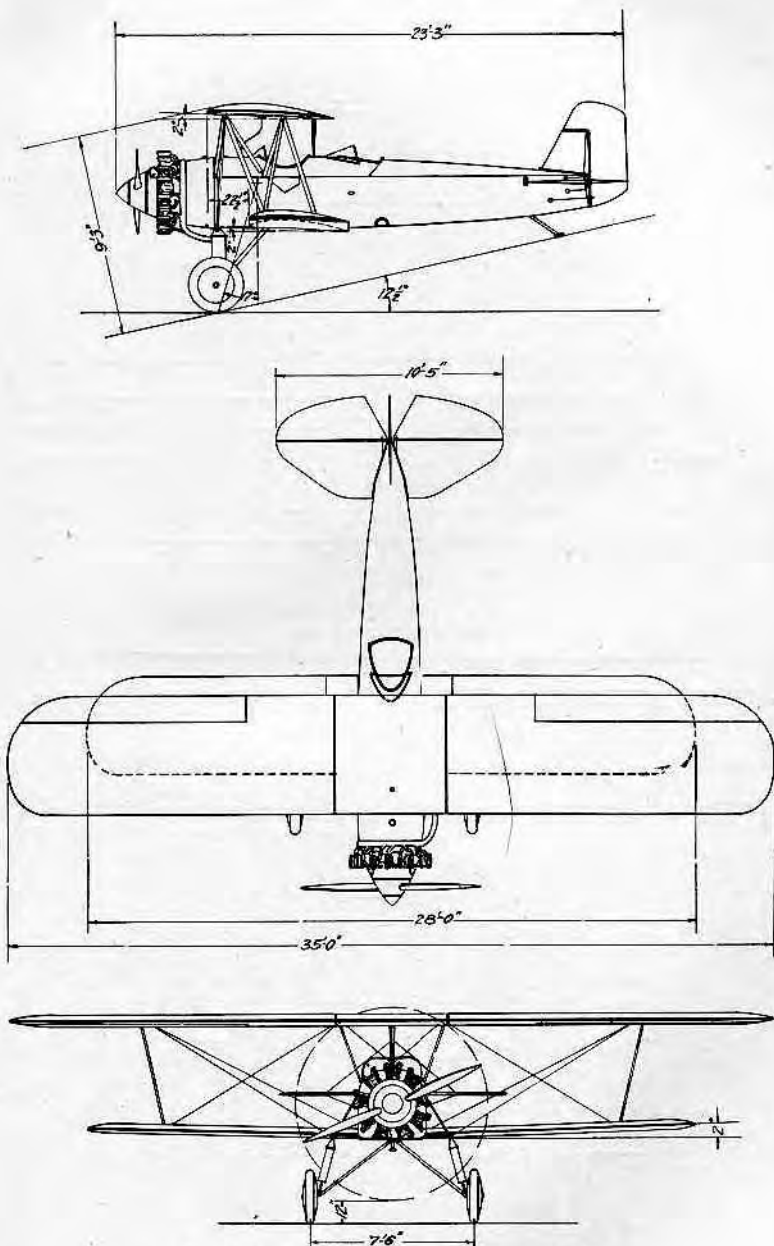
LONG DISTANCE AMPHIBIAN S-36-A

ENGINES—WRIGHT "WHIRLWIND"



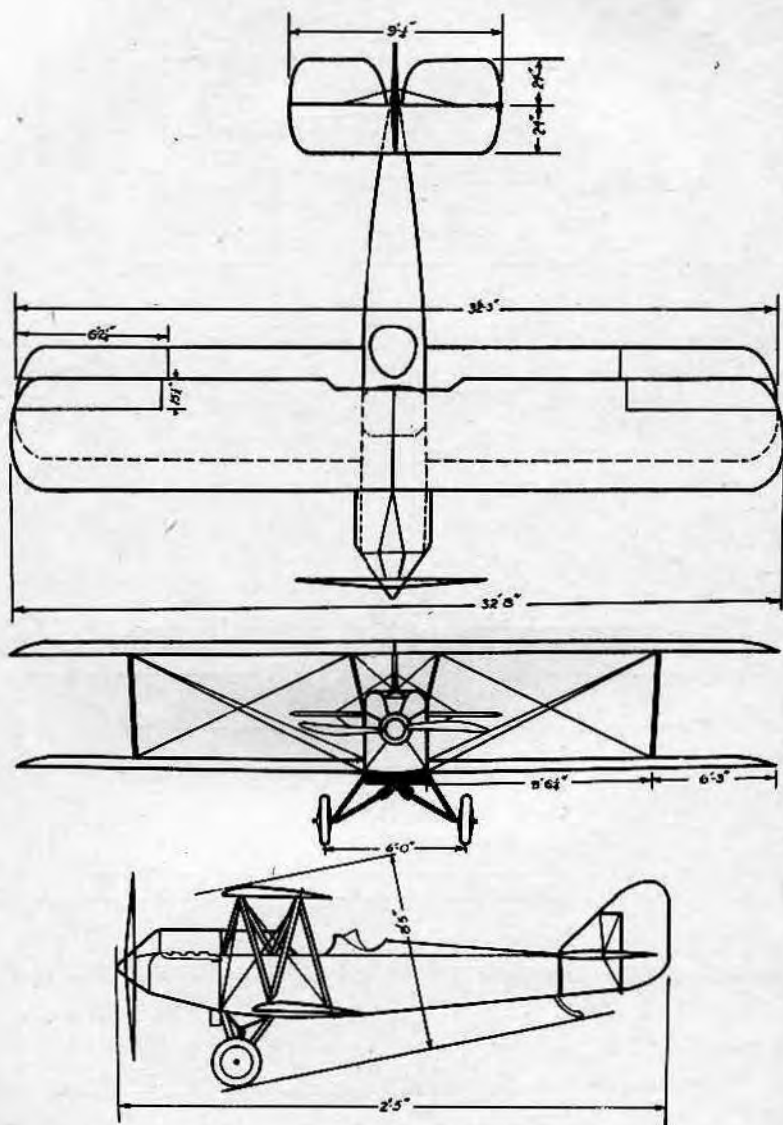
SIKORSKY MANUFACTURING CORP.
COLLEGE POINT, N. Y.

PASSENGER CARRIER S-37
ENGINES—"GNOME RHONE JUPITER"



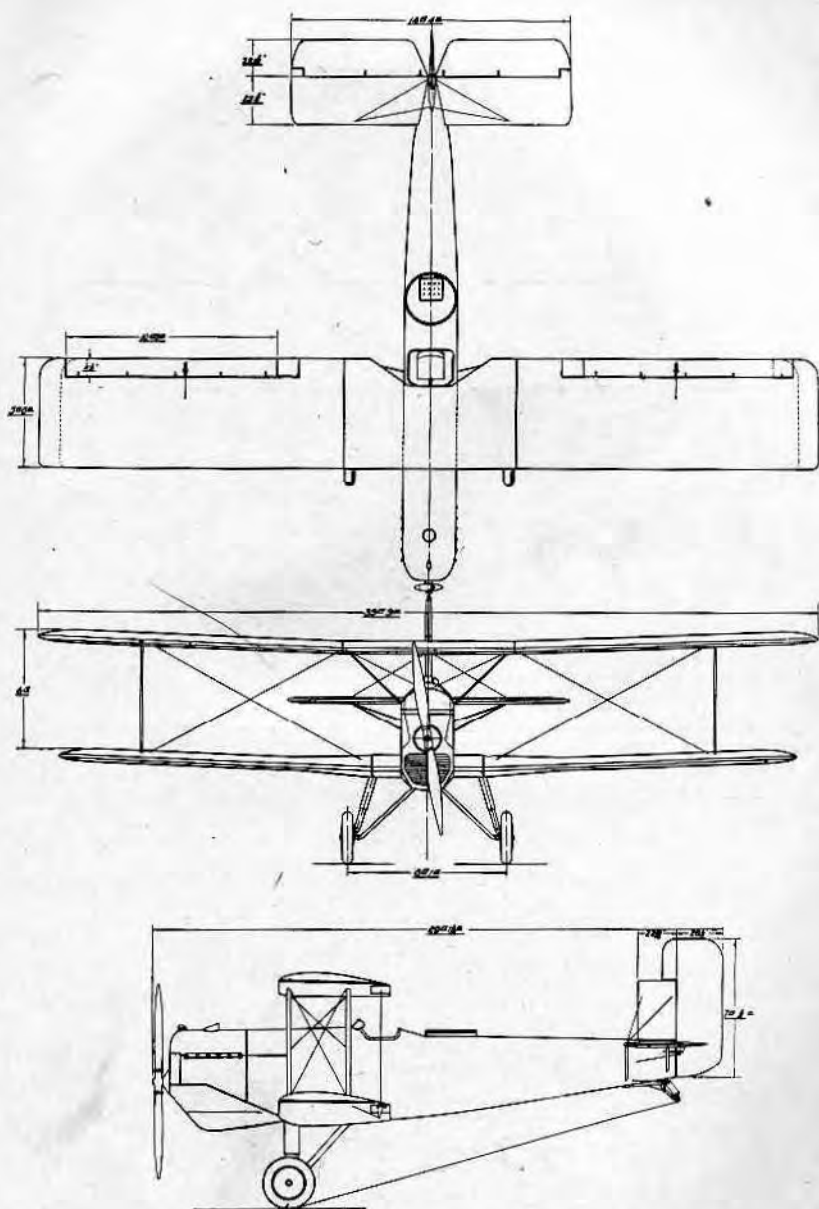
STEARMAN AIRCRAFT COMPANY
WICHITA, KAN.

THREE PLACE COMMERCIAL
ENGINE—WRIGHT "WHIRLWIND"



SWALLOW AIRPLANE COMPANY
WICHITA, KAN.

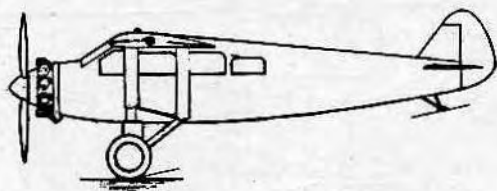
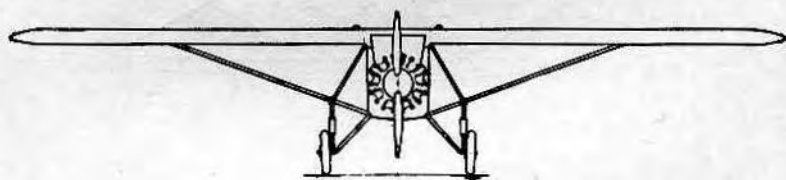
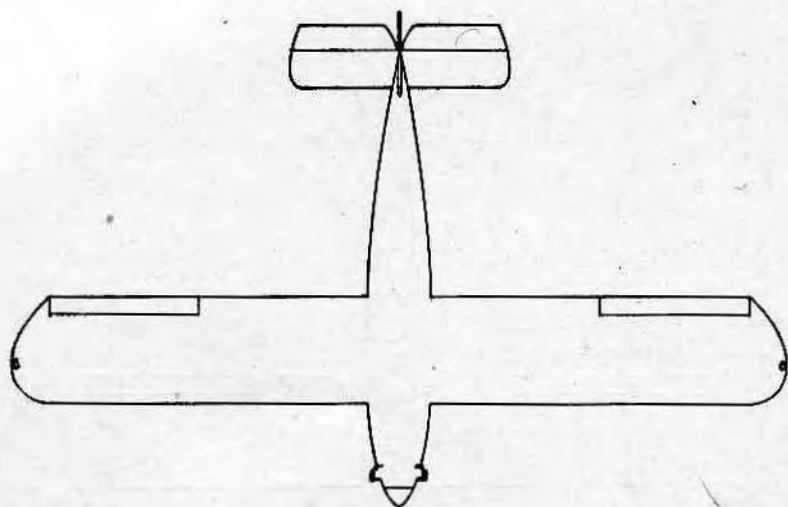
SWALLOW BIPLANE
ENGINE—CURTISS OX-5



THOMAS-MORSE AIRCRAFT CORPORATION
ITHACA, N. Y.

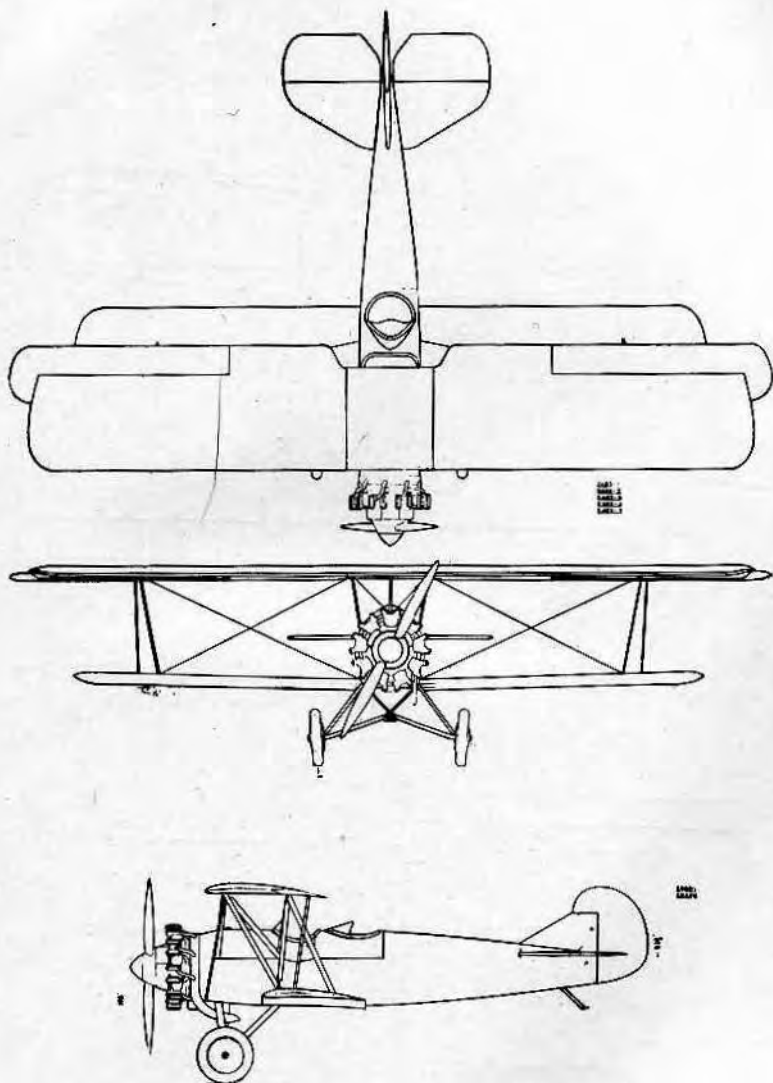
ALL METAL CORPS OBSERVATION
ENGINE—LIBERTY 12

385



TRAVEL AIR MFG. CO., INC.
WICHITA, KAN.

TRANSPORT MONOPLANE TYPE 6000
ENGINE—WRIGHT "WHIRLWIND"

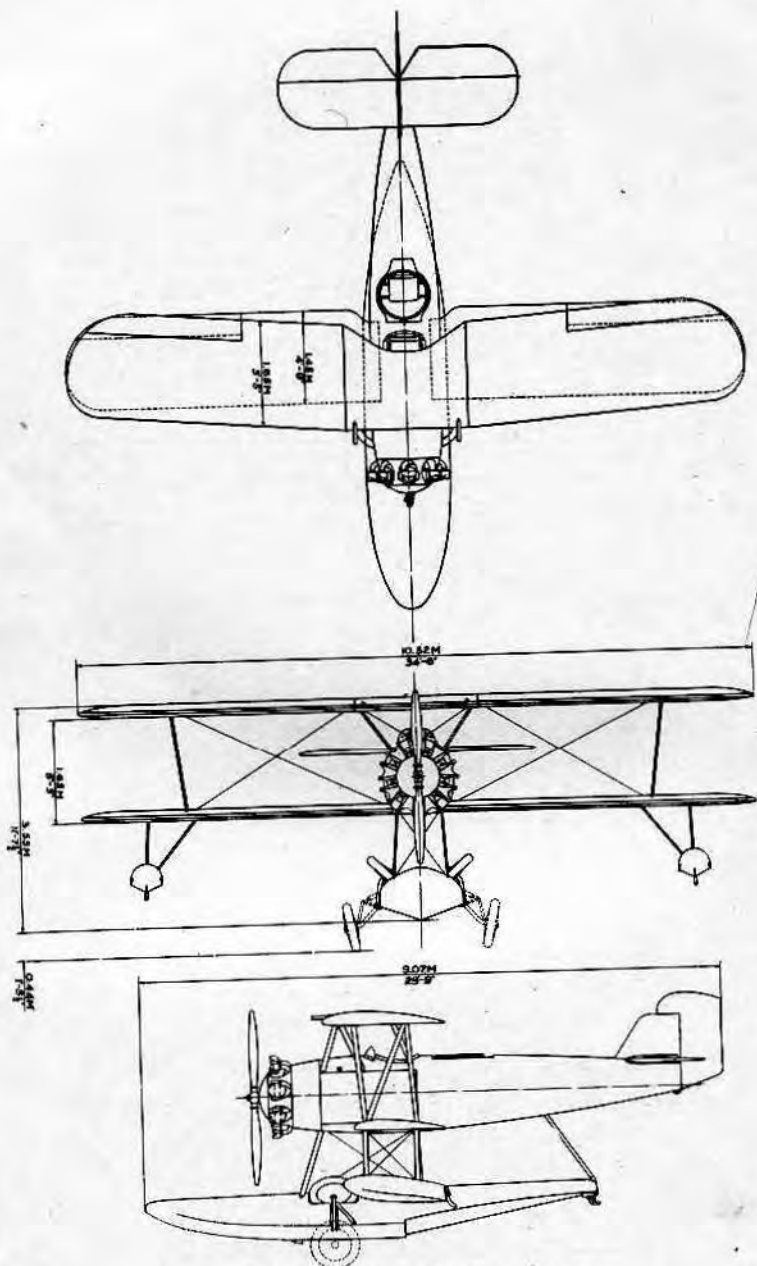


TRAVEL AIR MANUFACTURING CO.

WICHITA, KAN.

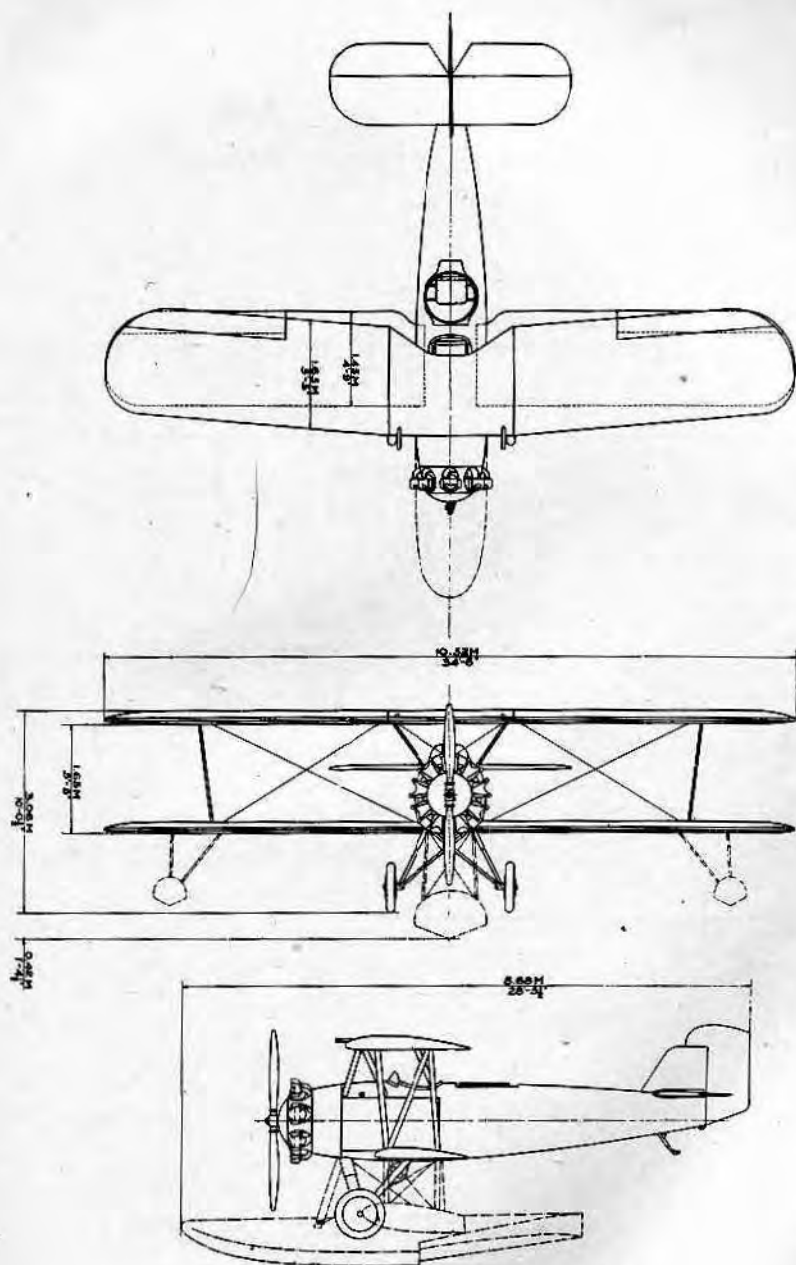
TYPE 4000

ENGINE—WRIGHT "WHIRLWIND"



CHANCE VOUGHT CORPORATION
LONG ISLAND CITY, N. Y.

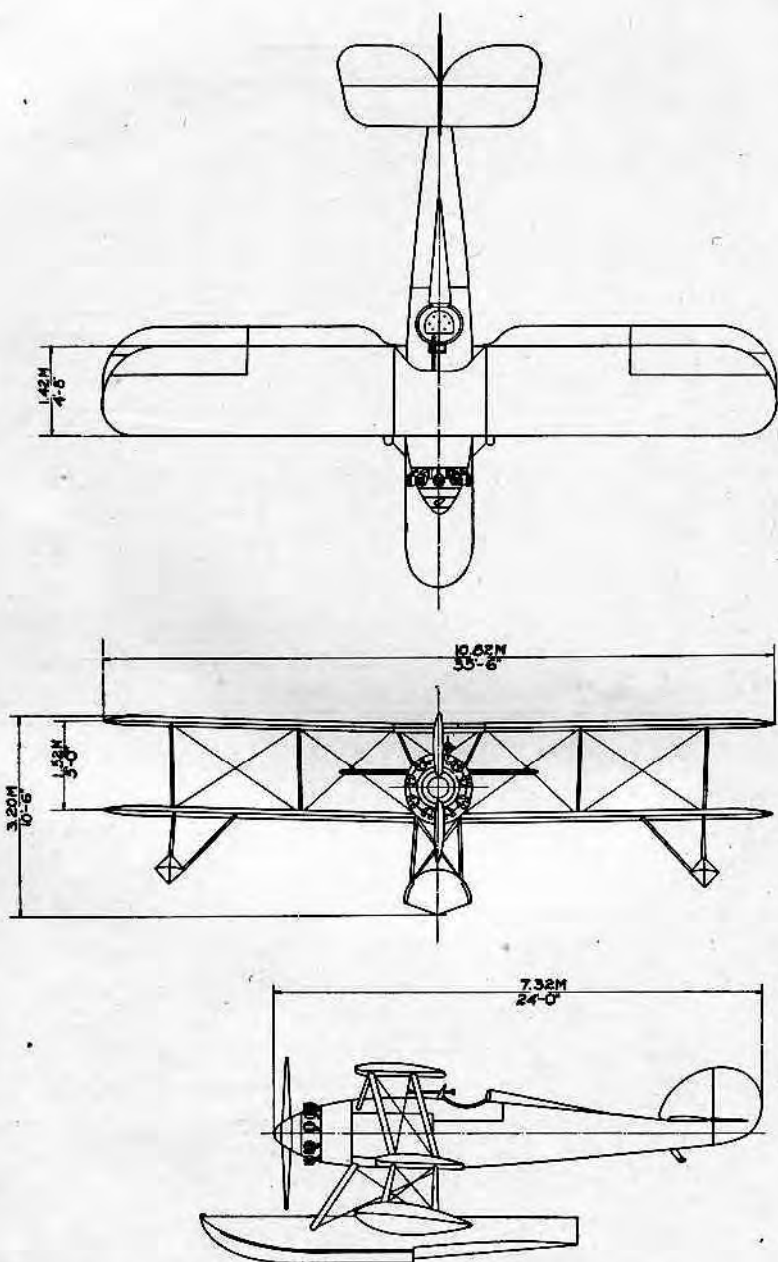
"CORSAIR" AMPHIBIAN (OBSERVATION-FIGHTER)
ENGINE—PRATT & WHITNEY "WASP"



CHANCE VUGHT CORPORATION
 LONG ISLAND CITY, N. Y.

"CORSAIR" OBSERVATION-FIGHTER
 (LAND OR SEAPLANE)

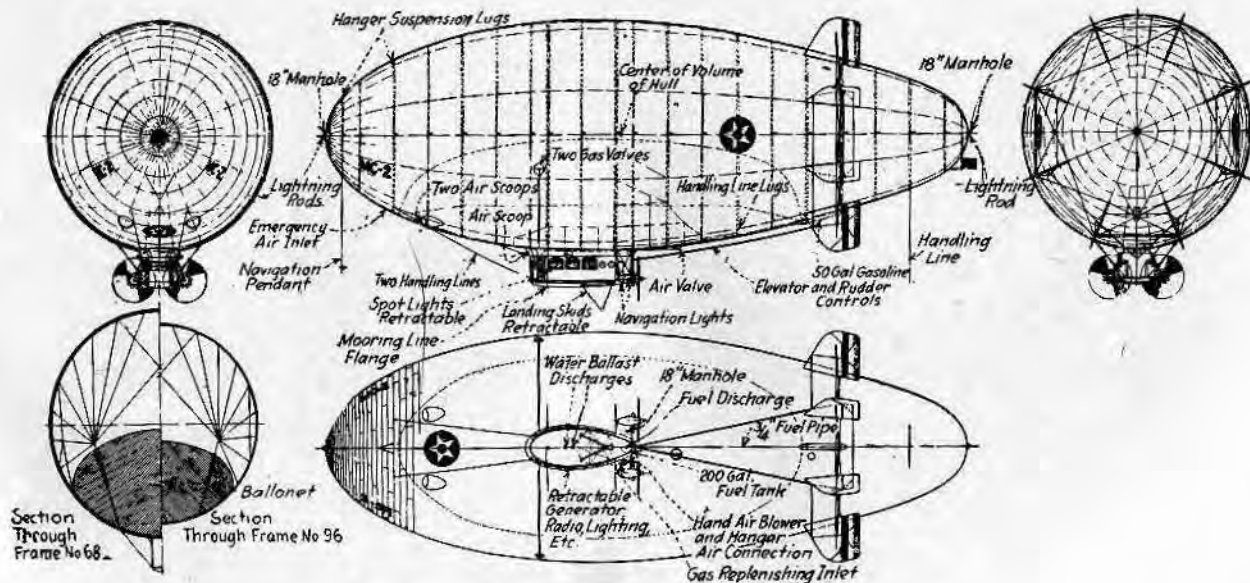
ENGINE—PRATT & WHITNEY "WASP"



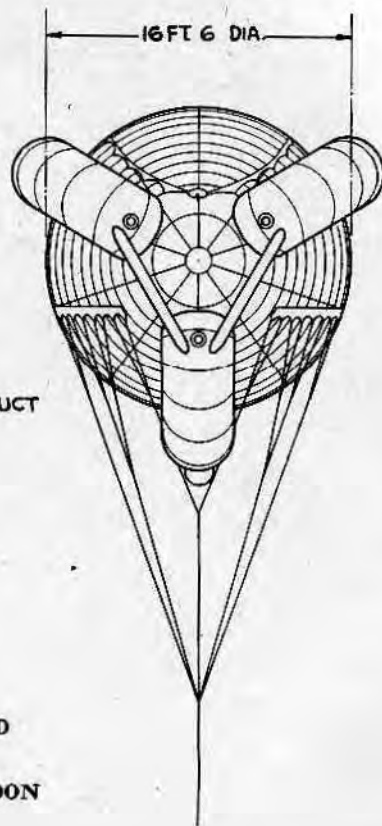
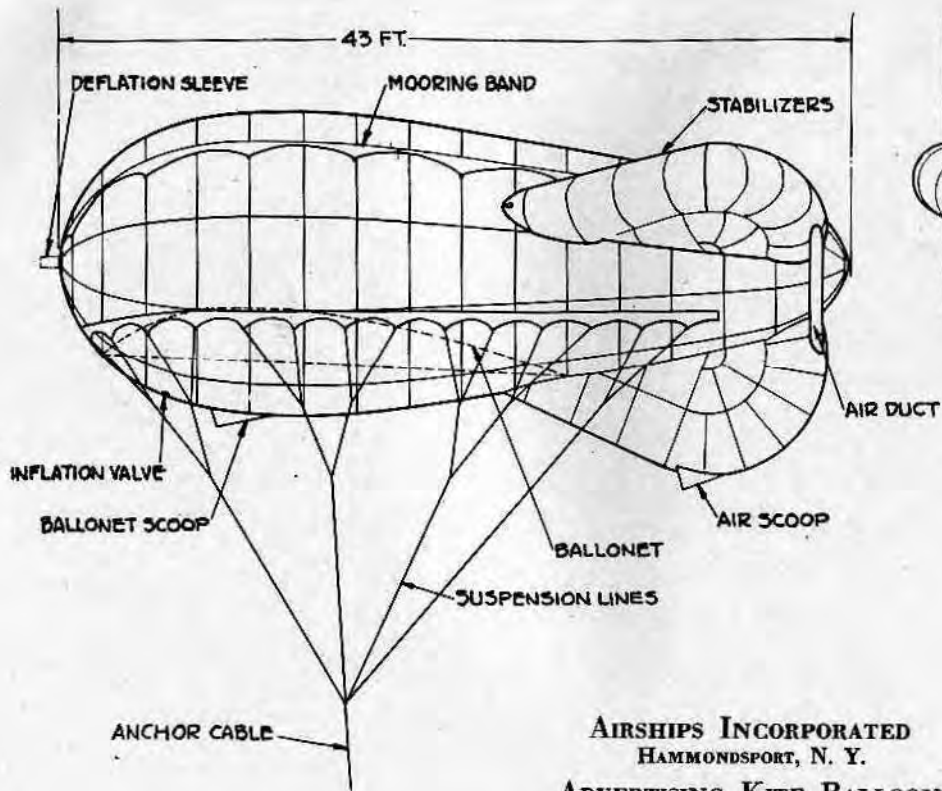
CHANCE VUGHT CORPORATION
LONG ISLAND CITY, N. Y.

TYPE FU-1

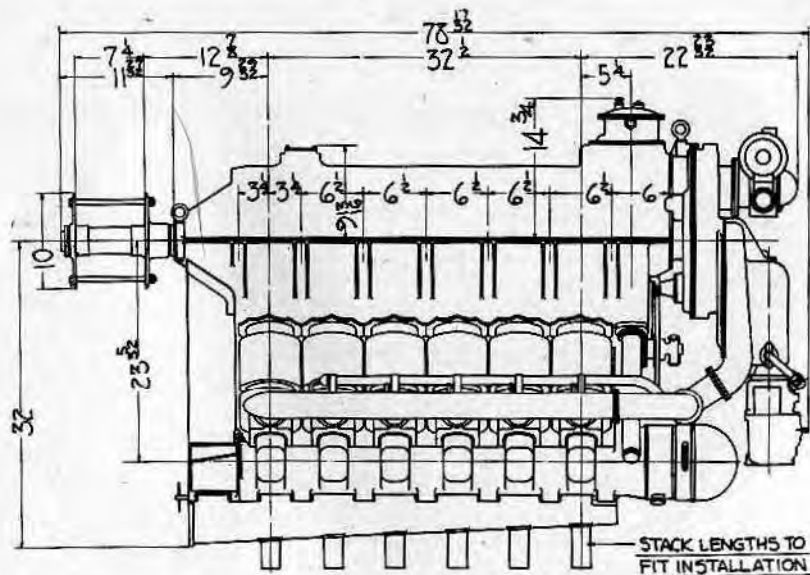
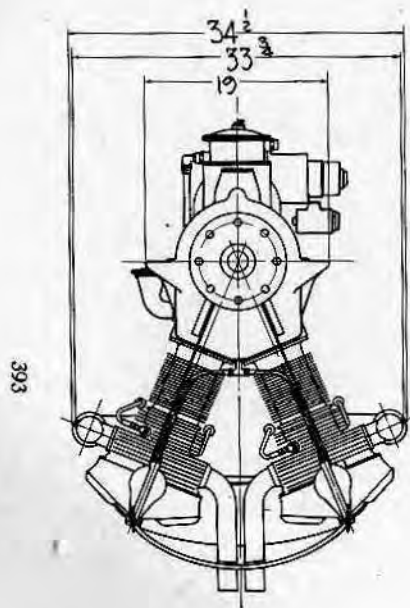
ENGINE—WRIGHT "WHIRLWIND"



AIRCRAFT DEVELOPMENT CORPORATION
DETROIT, MICH.
DESIGN OF METAL CLAD AIRSHIP 200,000 CU. FT.



AIRSHIPS INCORPORATED
HAMMONDSPORT, N. Y.
ADVERTISING KITE BALLOON

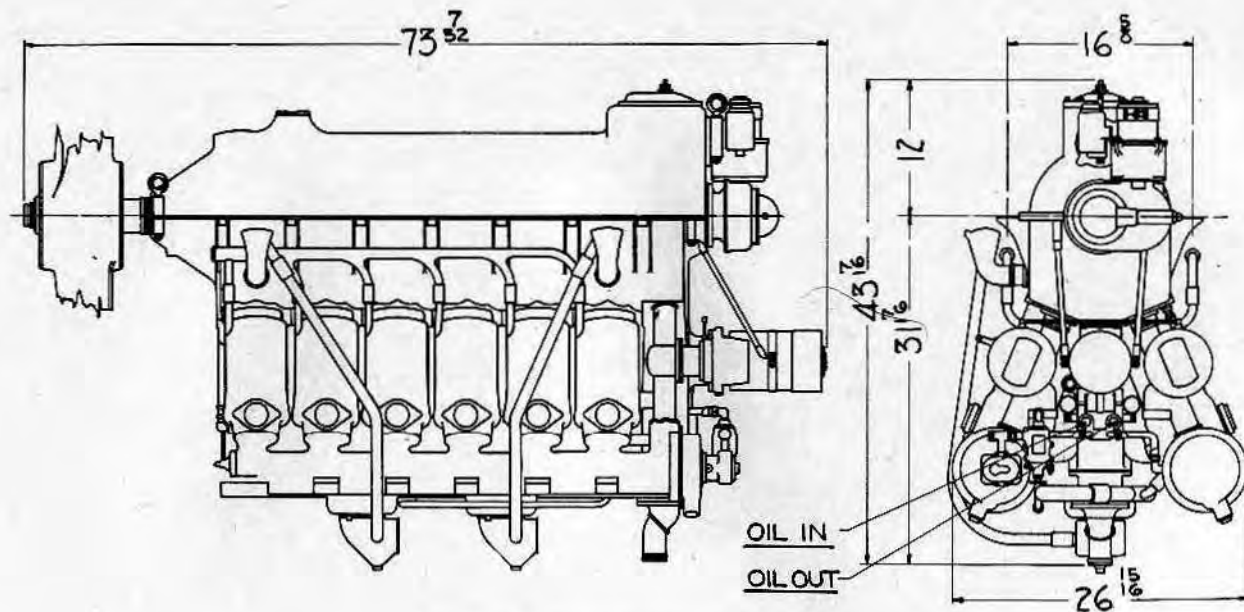


ALLISON ENGINEERING COMPANY
INDIANAPOLIS, IND.

INDIANAPOLIS, IND.

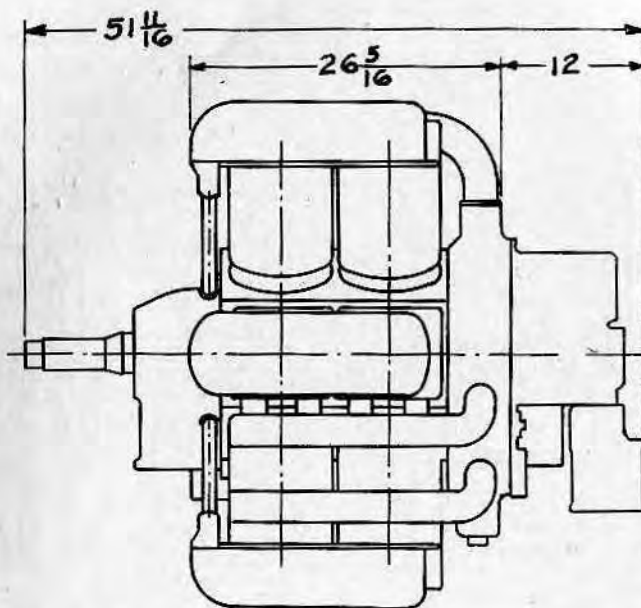
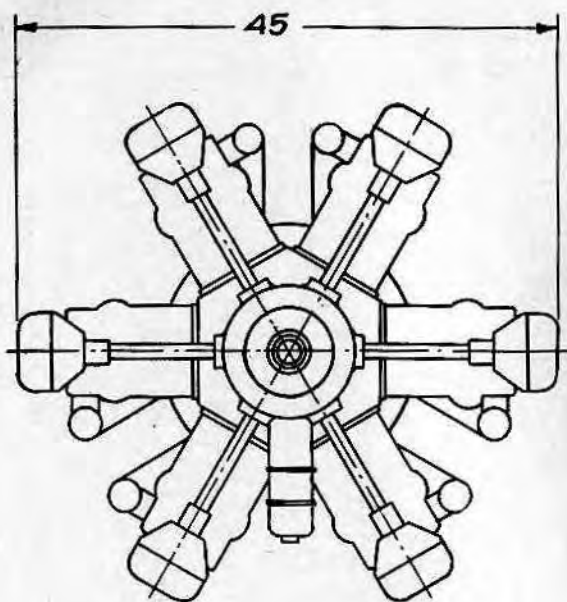
MODEL V-1410 12 CYLINDERS AIR COOLED INVERTED
430 B.H.P. AT 1900 ENGINE R.P.M. 1000 LBS.

430 B.H.P. AT 1900 ENGINE R.P.M. 1000 LBS



ALLISON ENGINEERING COMPANY
INDIANAPOLIS, IND.

MODEL V-1650 12 CYLINDERS WATER COOLED INVERTED
430 B.H.P. AT 1700 ENGINE R.P.M. 885 LBS. DRY



CURTISS AEROPLANE & MOTOR CO., INC.

GARDEN CITY AND BUFFALO, N. Y.

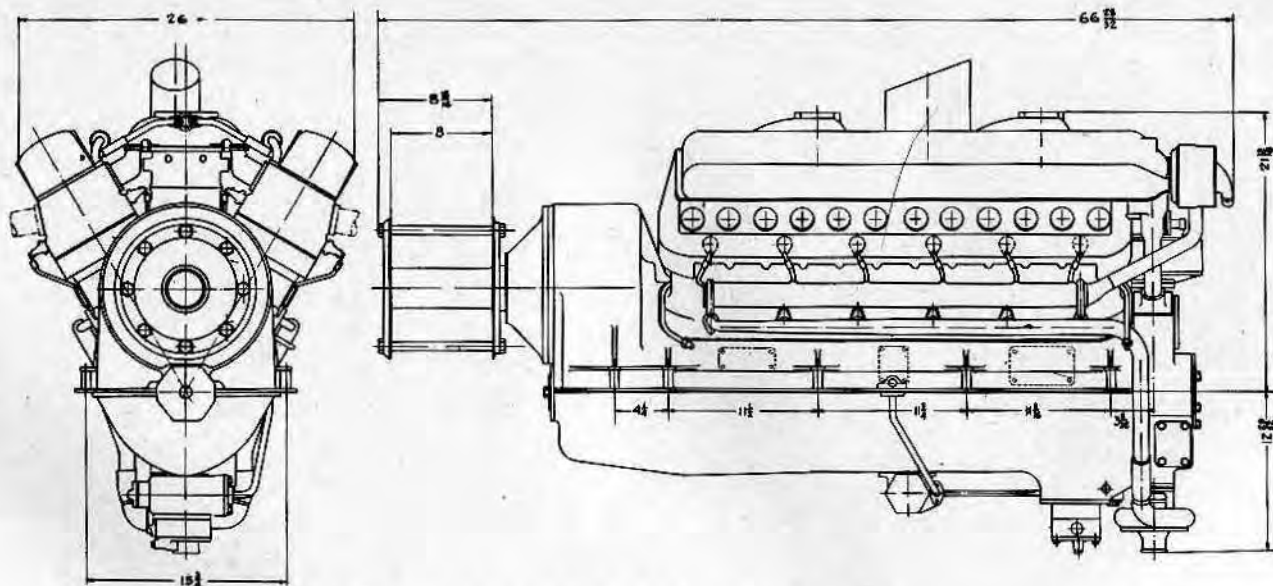
CHIEFTAIN

12 CYLINDERS

AIR COOLED

600 B.P.H. AT 2200 R.P.M.

WEIGHT 900 LBS.

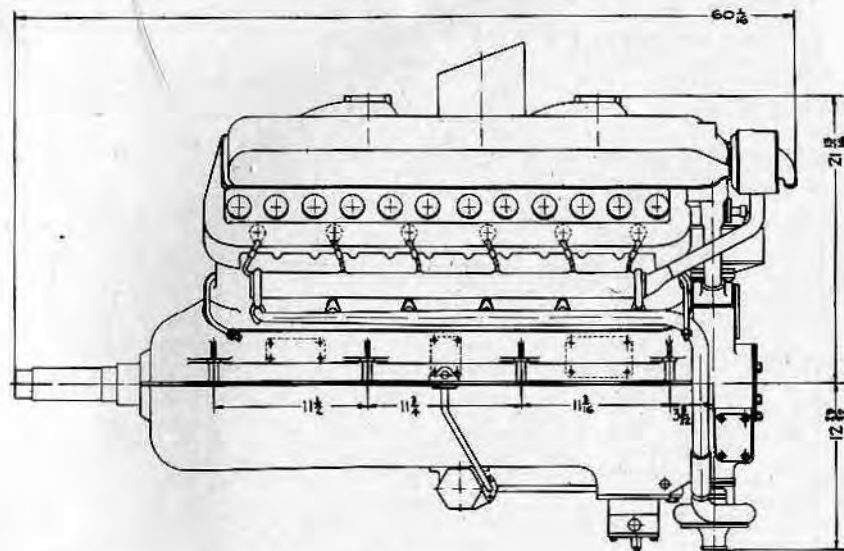
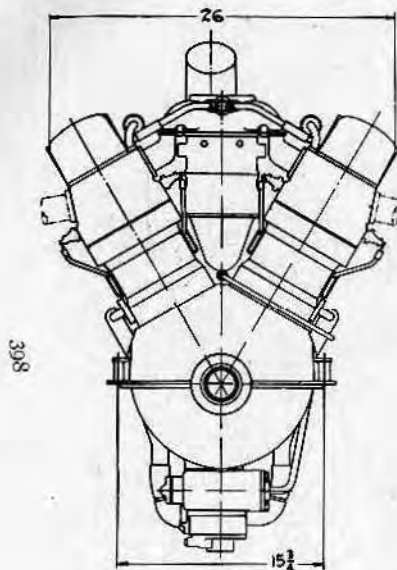


CURTISS AEROPLANE & MOTOR Co., INC.

GARDEN CITY AND BUFFALO, N. Y.

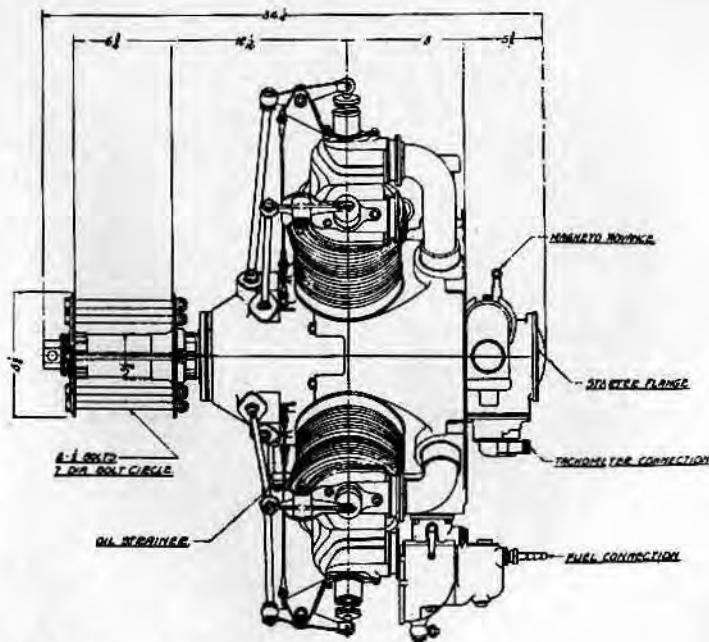
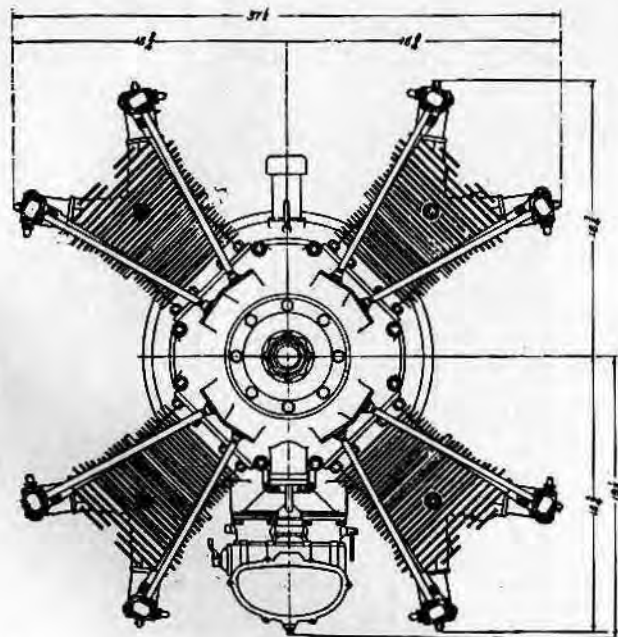
MODEL GV-1550 "CONQUEROR" 12 CYLINDERS WATER COOLED

600 B.H.P. AT 2400 R.P.M. WEIGHT 845 LBS. DRY



CURTISS AEROPLANE & MOTOR Co., INC.
GARDEN CITY AND BUFFALO, N. Y.

MODEL V-1550 "CONQUEROR" 12 CYLINDERS WATER COOLED
625 B.H.P. AT 2400 R.P.M. WEIGHT 755 LBS. DRY

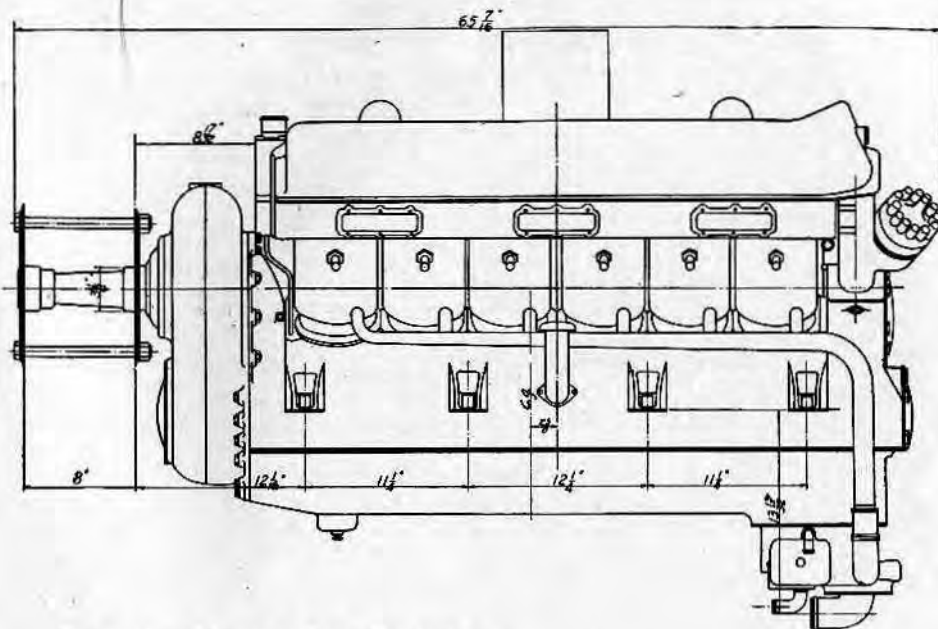
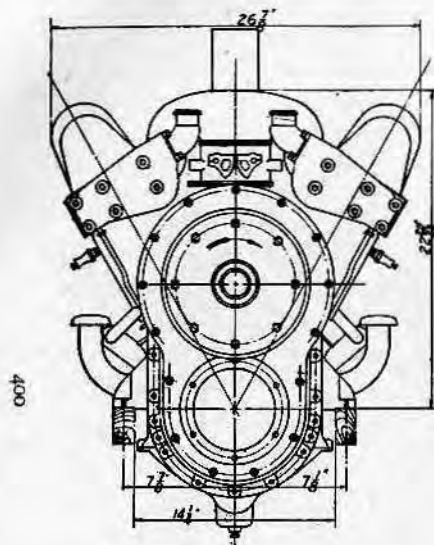


FAIRCHILD CAMINEZ ENGINE CORP.

FARMINGDALE, L. I., N. Y.

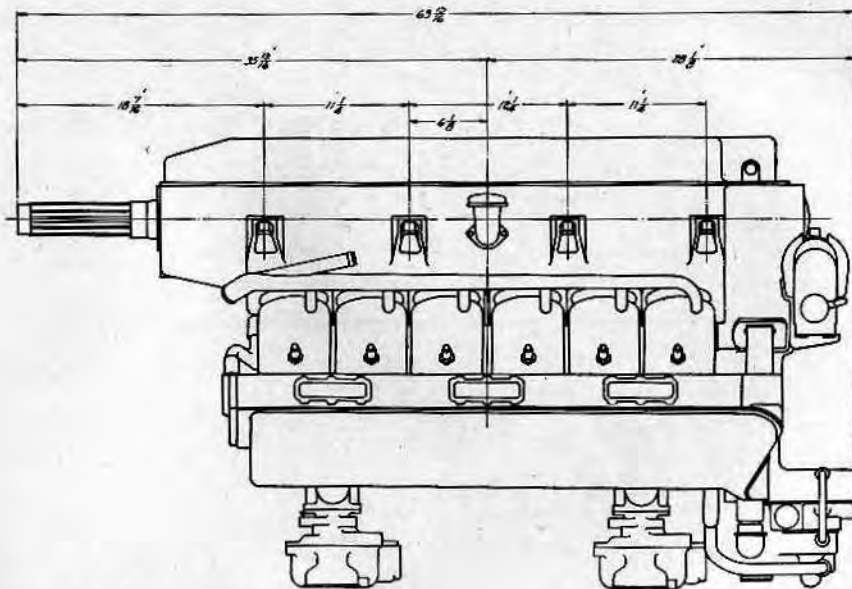
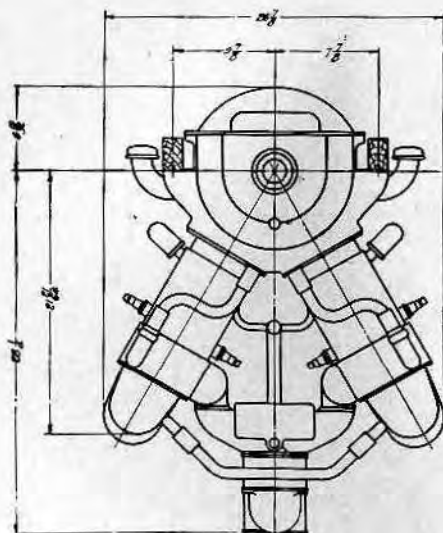
MODEL 447-C 4-CYLINDER AIR COOLED CAM ENGINE

RATED 135 H.P. AT 1000 R.P.M. 340 LBS. COMPLETE



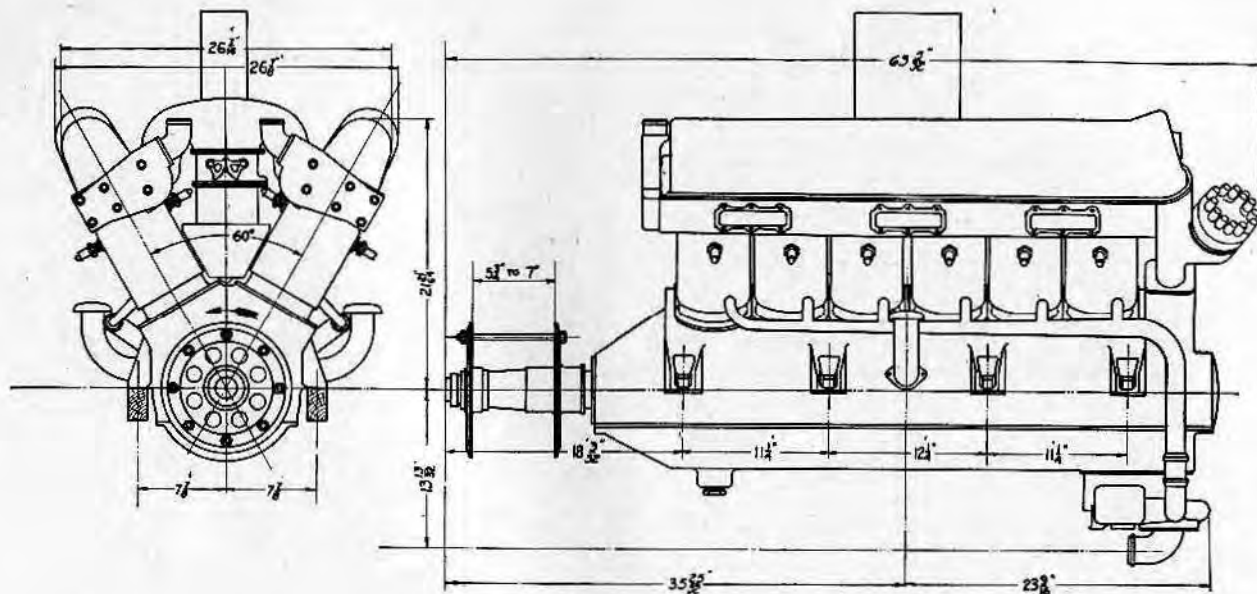
PACKARD MOTOR CAR COMPANY
DETROIT, MICH.

MODEL 2A-1500 GEARED 2:1 12 CYLINDERS WATER COOLED
600 B.H.P. AT 2500 ENGINE R.P.M. 850 LBS. DRY 30 LBS. WATER



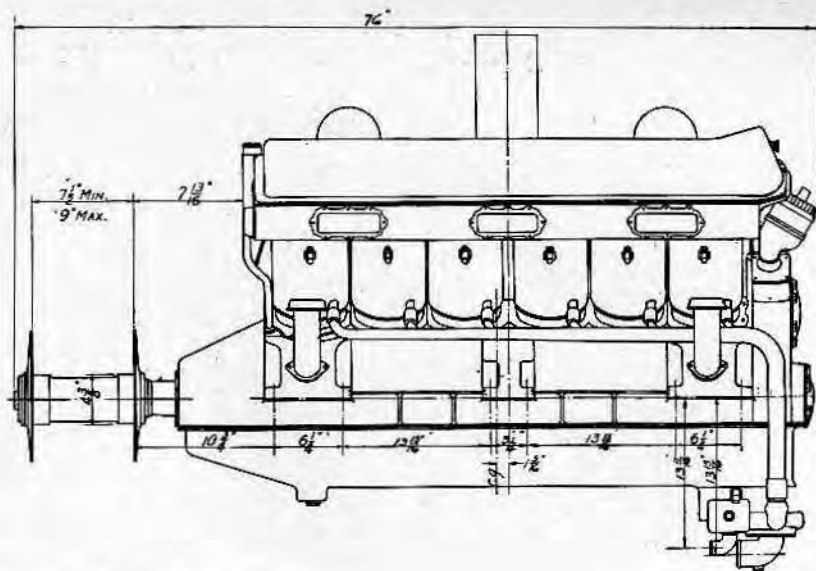
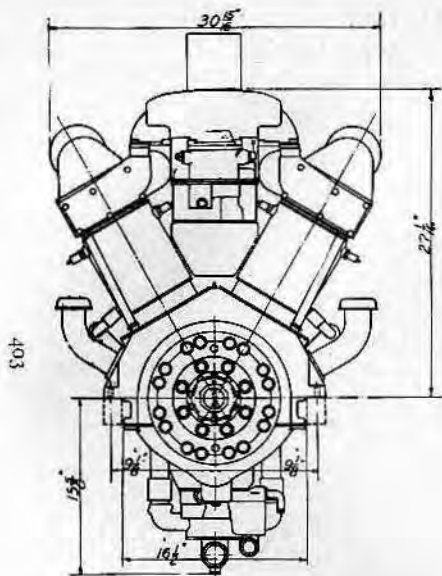
PACKARD MOTOR CAR COMPANY
DETROIT, MICH.

MODEL 2A-1500 12 CYLINDERS WATER COOLED
600 B.H.P. AT 2500 ENGINE R.P.M. 750 LBS. DRY 30 LBS. WATER



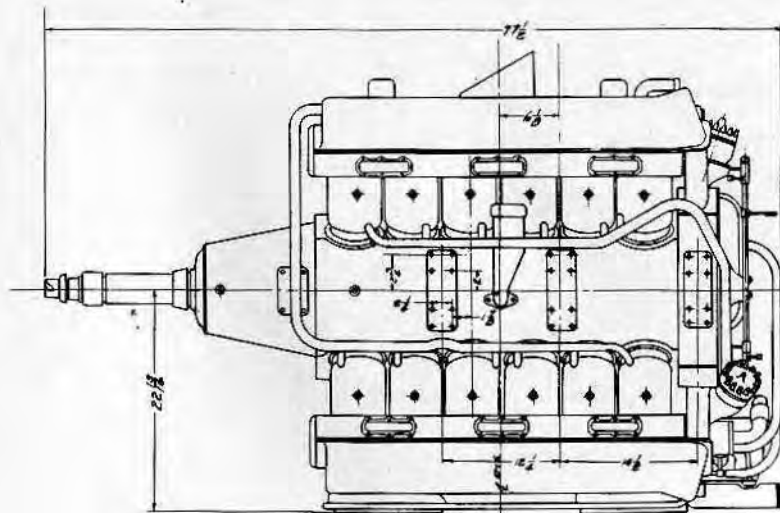
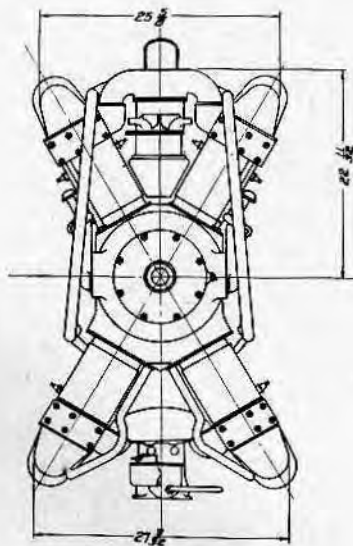
PACKARD MOTOR CAR COMPANY
DETROIT, MICH.

MODEL 2A-1500 12 CYLINDERS WATER COOLED
600 B.H.P. AT 2500 ENGINE R.P.M. 730 LBS. DRY 30 LBS. WATER



PACKARD MOTOR CAR COMPANY
DETROIT, MICH.

MODEL 2A-2500 12 CYLINDERS WATER COOLED
800 B.H.P. AT 2000 ENGINE R.P.M. 1146 LBS. DRY 39 LBS. WATER



PACKARD MOTOR CAR COMPANY
DETROIT, MICH.

MODEL 1A-2775

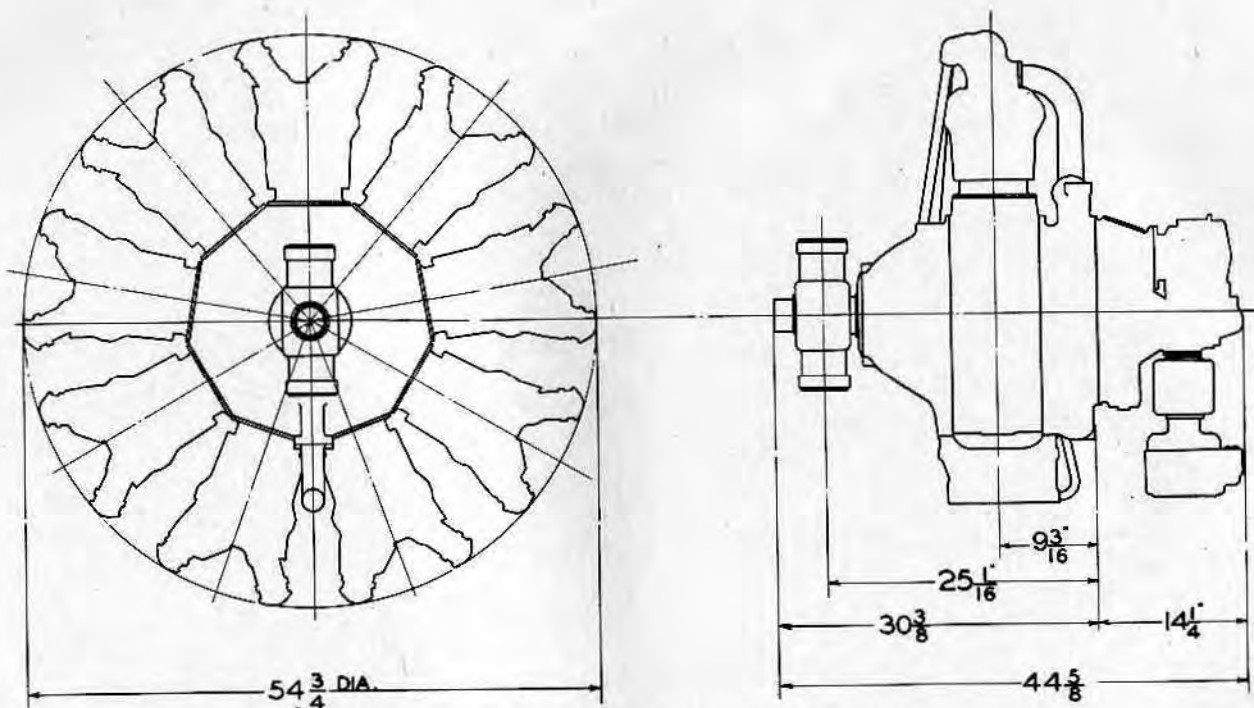
24 CYLINDERS

WATER COOLED

1250 B.H.P. AT 2700 ENGINE R.P.M.

1500 LBS. DRY

45 LBS. WATER



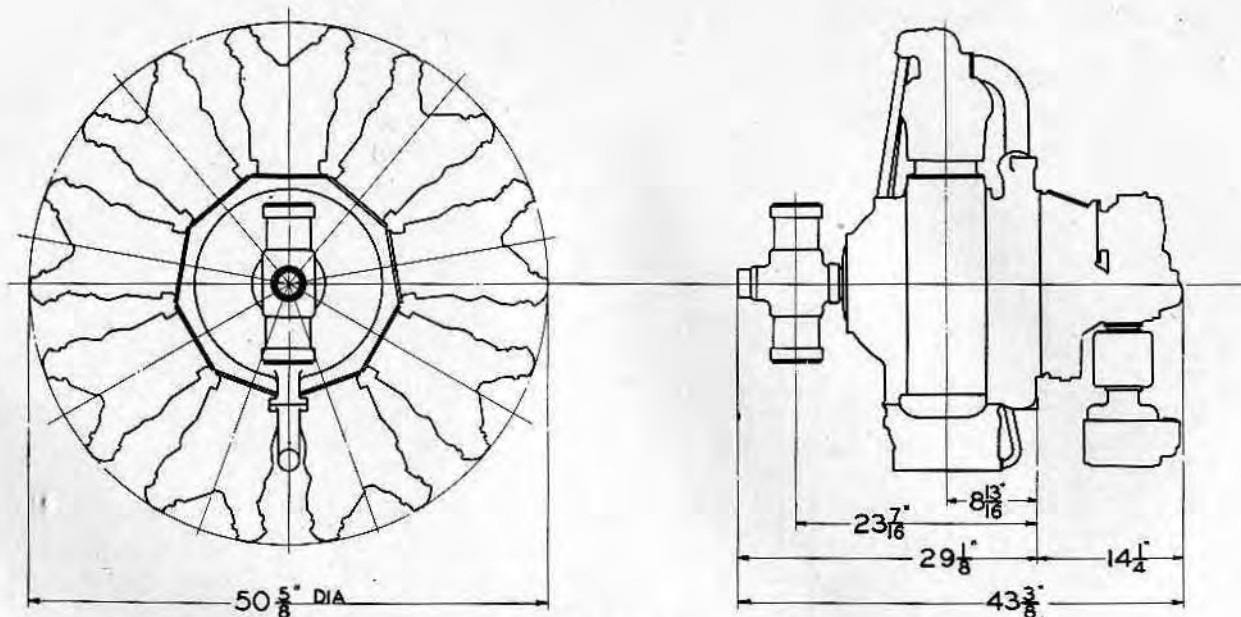
THE PRATT & WHITNEY AIRCRAFT COMPANY
HARTFORD, CONN.

"HORNET"

9 CYLINDERS

AIR COOLED

525 B.H.P. AT 1900 R.P.M. WEIGHT 750 LBS.



THE PRATT & WHITNEY AIRCRAFT COMPANY
HARTFORD, CONN.

"WASP"

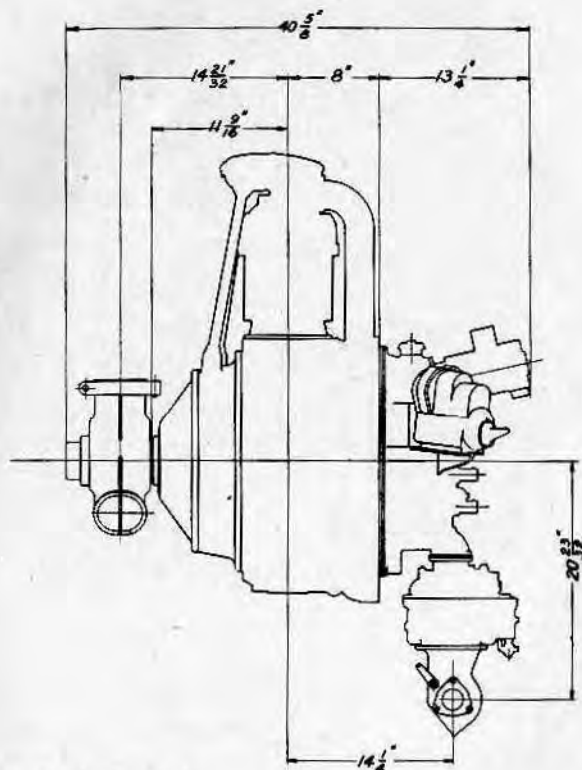
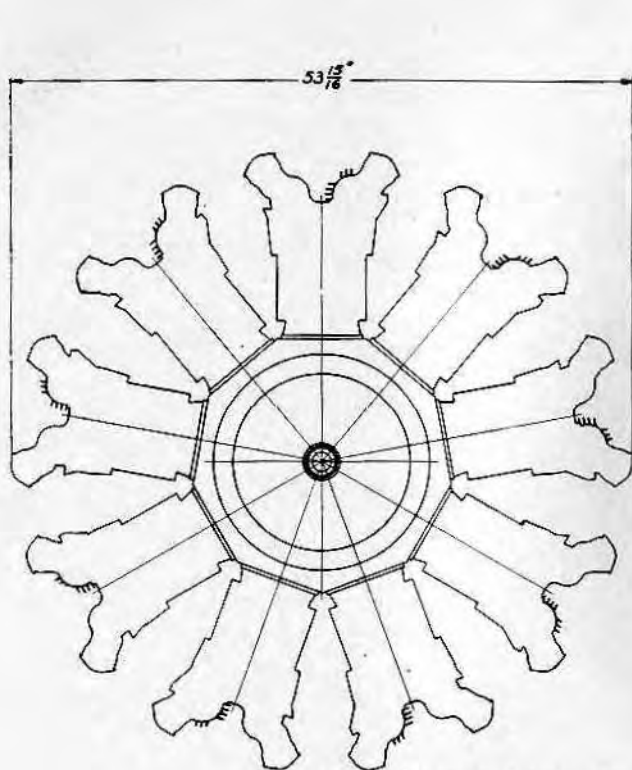
9 CYLINDERS

AIR COOLED

COMMERCIAL 400 B.H.P. AT 1900 R.P.M. WEIGHT 650 LBS.

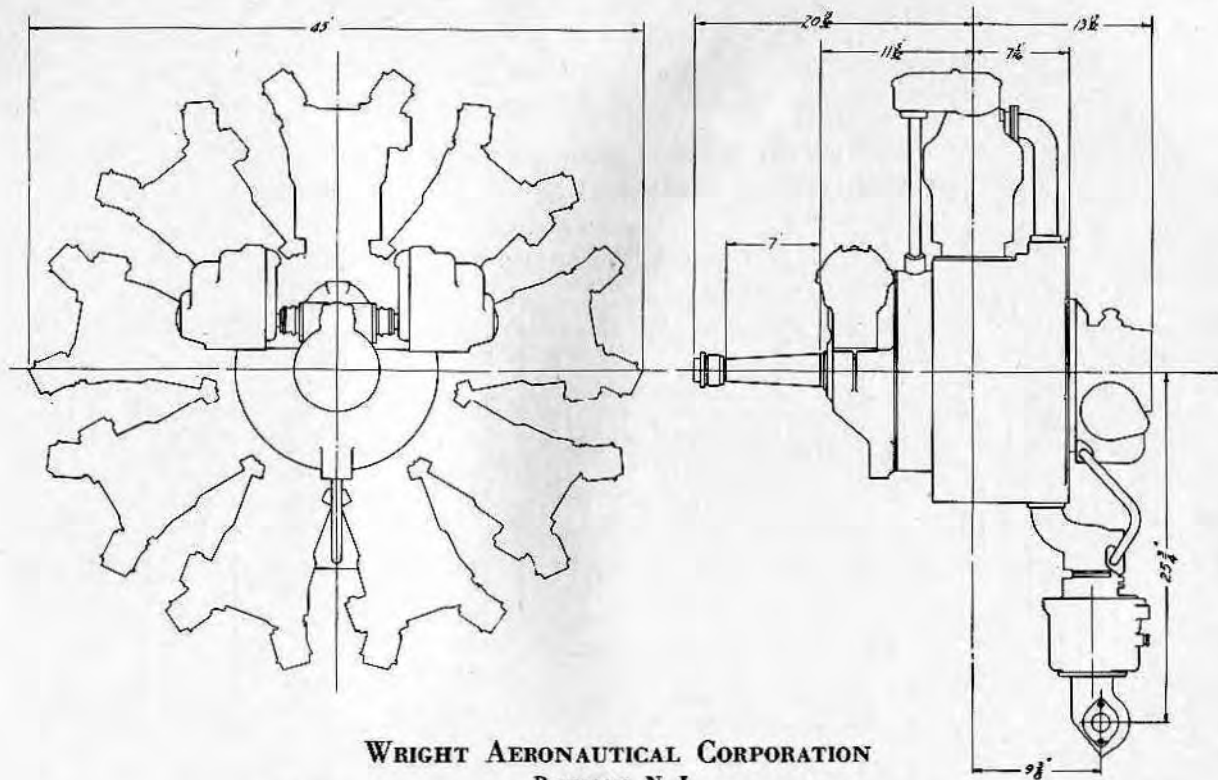
MILITARY SERIES "B" 450 B.H.P. AT 2100 R.P.M.

804



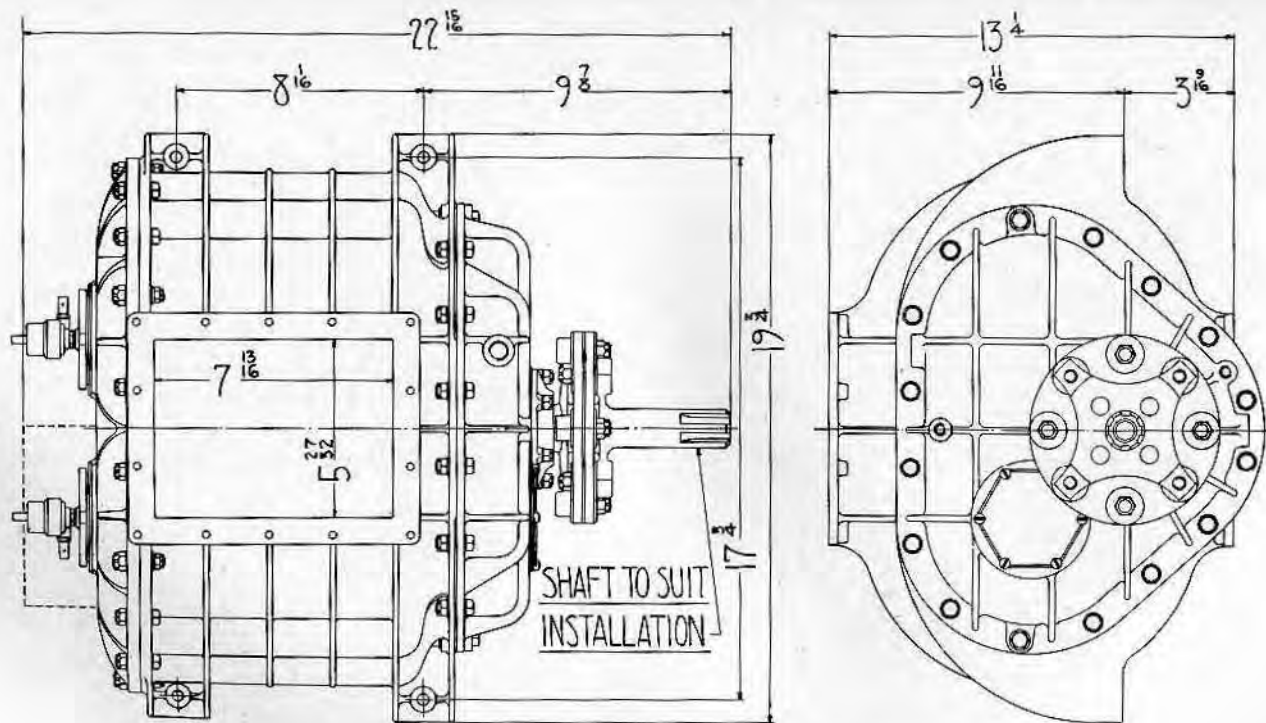
WRIGHT AERONAUTICAL CORPORATION
PATERSON, N. J.

"CYCLONE" R-1750 9 CYLINDERS AIR COOLED
STANDARD 525 B.H.P. AT 1900 R.P.M. WEIGHT DRY 760 LBS.



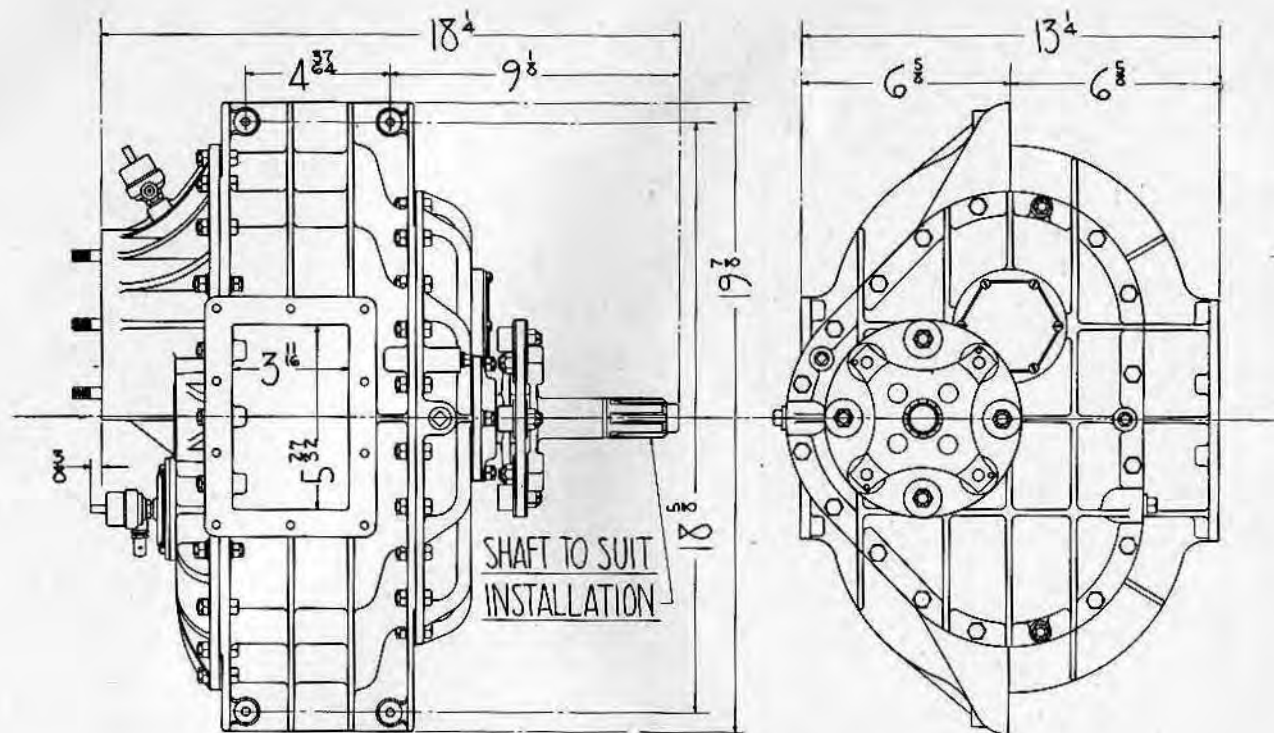
WRIGHT AERONAUTICAL CORPORATION
PATERSON, N. J.

"WHIRLWIND" J-5 9 CYLINDERS AIR COOLED
STANDARD 200 B.H.P. AT 1800 R.P.M. WEIGHT DRY 525 LBS.

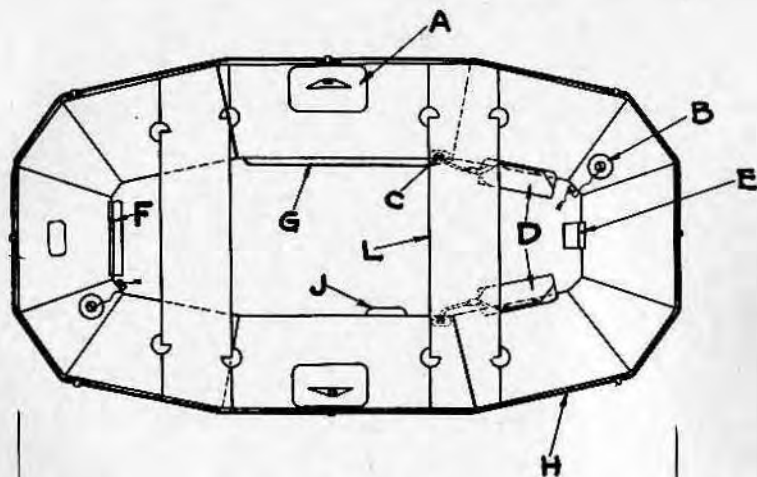


ALLISON ENGINEERING COMPANY
INDIANAPOLIS, IND.

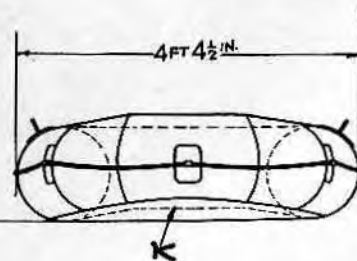
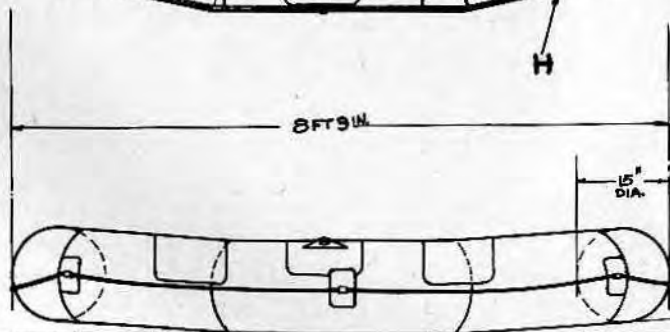
N. A. C. A. ROOTS TYPE SUPERCHARGER
MODEL 2 ENGINES 900 TO 1800 CU. IN. DISPLACEMENT



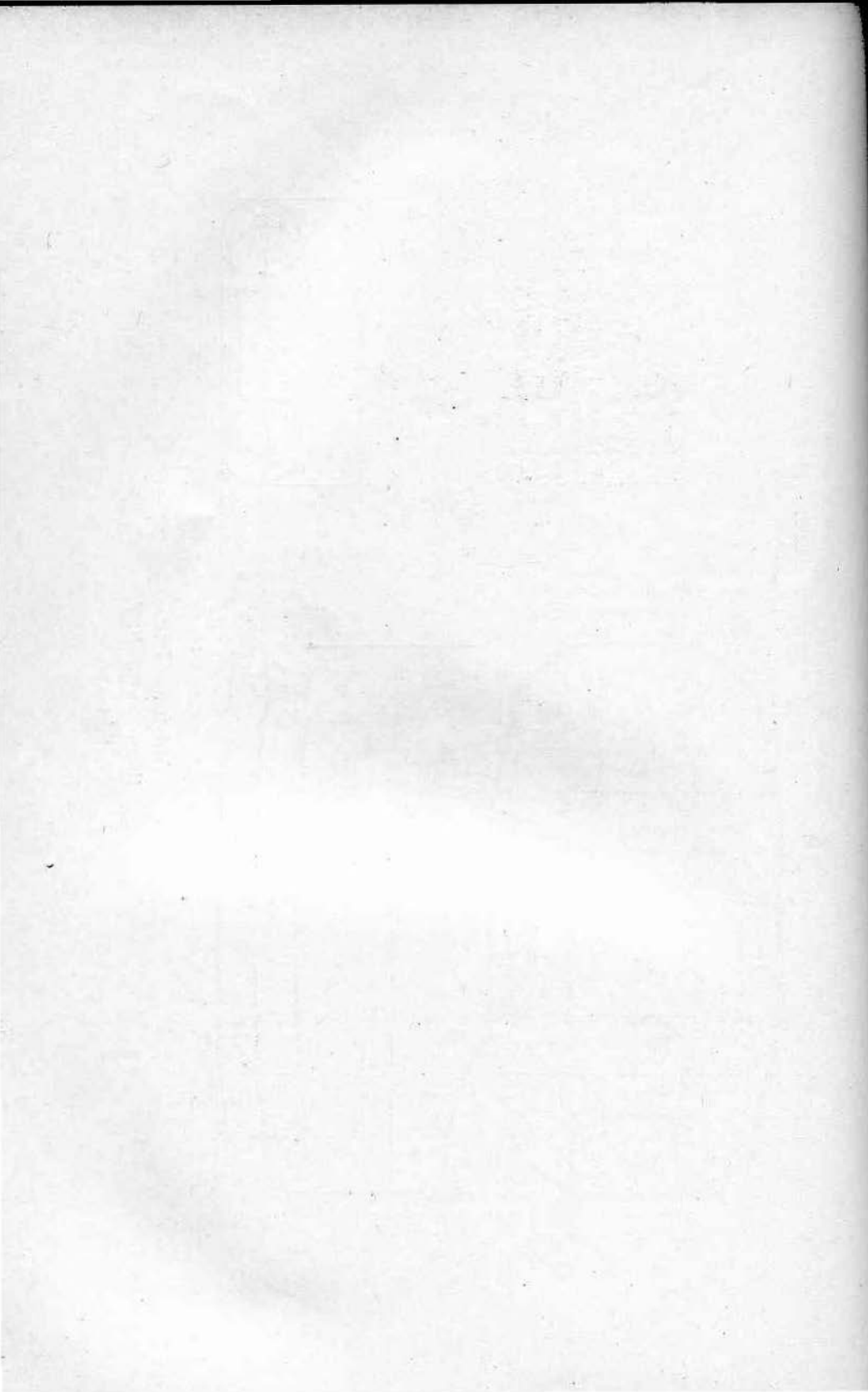
ALLISON ENGINEERING COMPANY
 INDIANAPOLIS, IND.
N. A. C. A. ROOTS TYPE SUPERCHARGER
 MODEL 3 ENGINES 450 TO 900 CU. IN. DISPLACEMENT



- A—Oar Lock
- B—Pump Valve
- C—CO₂ Inflation Valve
- D—1.5 # Bottle of CO₂
- E—Canteen Pocket
- F—Ration and Chart Pocket
- G—Pump and Oar Pocket
- H—Life Line
- J—Watertight Repair Kit
- K—Bottom
- L—Seat



AIRSHIPS, INC.
HAMMONDSPORT, N. Y.
"AIRAFT"



APPENDIX
AERONAUTICAL CHAMBER OF COMMERCE
OF AMERICA, Inc.



300 Madison Ave., New York, N. Y.

OBJECTS OF THE AERONAUTICAL CHAMBER OF COMMERCE
OF AMERICA, AS SET FORTH IN THE ARTICLES
OF INCORPORATION

TO foster, advance, promulgate, and promote trade and commerce, throughout the United States, its territories, possessions, and in foreign countries, in the interests of those persons, firms or corporations engaged in the business of manufacturing, buying, selling and dealing in aircraft, aircraft motors, and aircraft parts and accessories of every kind and nature.

To reform any and all abuses which may arise relative thereto.

To secure for its members and those persons, firms or corporations dealing with them, freedom from unjust or unlawful exactions of whatever description.

To diffuse among its members accurate and reliable information as to the standing of its members and those persons, firms or corporations engaged in similar lines of business.

To procure uniformity and certainty in the customs and usages of trade and commerce among its members and those persons, firms or corporations having a common trade, business or professional interest in all matters pertaining to aeronautics.

To aid and assist in mapping out air roads and lanes, the location of landing fields, airdromes, hangars, or such other structures as may be necessary for the advancement of aeronautics.

To advocate and promote in every lawful way the enactment of just and equitable laws, both national and state, pertaining to aeronautics.

To settle, adjust and arbitrate any and all differences which may arise between its members, and persons, firms or corporations dealing with them.

To promote a more enlarged and friendly intercourse between its members and persons, firms or corporations engaged in the business of, or dealing in aircraft, motors and aircraft parts and accessories.

To acquire by grant, gift, purchase, devise, bequest, and to hold and dispose of, such property or assets as the purposes of the corporation shall require, subject to such restrictions as may be prescribed by law, and

Generally to do every act and thing which may be necessary and proper for the advancement of the aeronautical art and industry and the accomplishment of the objects and purposes hereinbefore set forth; provided, however, that nothing herein contained shall authorize this corporation to engage in any business for pecuniary profit.

AERONAUTICAL CHAMBER OF COMMERCE OF AMERICA, Inc.



Officers

President	Paul Henderson.
First Vice-President	S. M. Fairchild.
Second Vice-President	C. M. Vought.
Third Vice-President	L. B. Valentine.
Treasurer	C. H. Colvin.
Secretary	H. F. Pitcairn.
General Manager and Assistant Treasurer	Samuel S. Bradley.
Assistant Secretary	Owen A. Shannon.

Governors

Paul Henderson.	Charles L. Lawrance.	S. M. Fairchild.
Frank H. Russell.	J. Lansing Callan.	H. F. Pitcairn.
John F. O'Ryan.	Samuel S. Bradley.	Lester D. Gardner.
E. N. Gott.	E. A. Johnson.	C. M. Vought.
Charles H. Colvin.	G. P. Tidmarsh.	L. B. Valentine.

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S. M. Fairchild.
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J. D. Hartson.
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G. P. Tidmarsh.

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Missouri—W. B. Robertson, St. Louis.
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New York—A. J. Elias, Buffalo.
C. R. Keys, Buffalo.
R. H. Fleet, Buffalo.
Raymond Ware, Ithaca.
Ohio—E. A. Johnson, Dayton.
C. J. Bruckner, Troy.
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Wisconsin—Thomas Hamilton, Milwaukee.

AERONAUTICAL CHAMBER OF COMMERCE OF AMERICA, Inc.

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 American Machinist, New York, N. Y.
 American Neon Light & Sign Co., New York, N. Y.
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 Aviation Publishing Co., New York, N. Y.
 Aviation Inst. of U. S. A., Washington, D. C.
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 B. B. T. Corp. of America, Philadelphia, Pa.
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 Berry Brothers, Inc., Detroit, Mich.
 Boeing Airplane Co., Seattle, Wash.
 Bohn Aluminum & Brass Corp., Detroit, Mich.
 Brewster & Company, Long Island City, N. Y.
 Brock & Weymouth, Philadelphia, Pa.
 Carpenter Steel Co., Reading, Pa.
 Central States Aero Co., Davenport, Iowa.
 Cessna Airplane Co., Wichita, Kan.
 Chilton Class Journal, New York, N. Y.
 Colonial Air Transport, Inc., New York, N. Y.
 Consolidated Aircraft Corp., Buffalo, N. Y.
 Curtiss Aeroplane & Motor Co., Garden City, L. I.
 Curtiss Aeroplane Export Co., New York, N. Y.
 Douglas Company, Santa Monica, Calif.
 Dupont De Nemours & Co., E. I., Wilmington, Del.
 Eastman Kodak Company, Rochester, N. Y.
 Eberhart Aeroplane & Motor Co., Hamburg, N. Y.
 Eclipse Machine Co., Hoboken, N. J.
 Edison Lamp Works, Harrison, N. J.
 Edo Aircraft Corp., College Point, L. I.
 Electric Storage Battery Co., Philadelphia, Pa.
 Elgin National Watch Co., Chicago, Ill.
 Elias & Bro., G., Inc., Buffalo, N. Y.
 Fairchild Aviation Corp., New York, N. Y.
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 Folmer Clogg & Co., Lancaster, Pa.
 General Electric Co., Schenectady, N. Y.
 B. F. Goodrich Rubber Co., Akron, Ohio.
 Goodyear Tire & Rubber Co., Akron, Ohio.
 Gulf Refining Co., Philadelphia, Pa.
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 Loening Aeronautical Engineering Corp., New York, N. Y.
 Ludington-Philadelphia Flying Service, Philadelphia, Pa.
 Macwhitty Company, Kenosha, Wis.
 B. F. Mahoney Aircraft Corp., San Diego, Calif.
 Manufacturers Aircraft Assn., New York, N. Y.
 Marsh & McLennan, New York, N. Y.
 Maryland Metal Bldg. Co., Philadelphia, Pa.
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 National Air Transport, Inc., Chicago, Ill.
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 New York Testing Laboratories, New York, N. Y.
 Norma Hoffman Bearings Co., Stamford, Conn.
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 Overcashier Aircraft Mfg. Co., Detroit, Mich.
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 Paragon Engineers, Inc., Baltimore, Md.
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 Parker & Co., Philadelphia, Pa.
 Perry-Austin Mfg. Co., Grasmere, L. I.
 Pioneer Instrument Co., Brooklyn, N. Y.
 Piteairn Aviation, Inc., Philadelphia, Pa.
 Pratt & Whitney Aircraft Co., Hartford, Conn.
 Prest Airplanes & Motors, Arlington, Calif.
 Prudden-San Diego Airplane Co., San Diego, Calif.
 Radio Corporation of America, New York, N. Y.
 Reed Propeller Co., New York, N. Y.

Renington Burnelli Airplane Co., New York, N. Y.
 Reynolds Airways, New York, N. Y.
 Robertson Aircraft Corp., Anglum, Mo.
 Roehling's Sons Co., Trenton, N. J.
 Russell Parachute Co., San Diego, Calif.
 Ryan Aeronautical Corp., San Diego, Calif.
 Scintilla Magneto Co., Sidney, N. Y.
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 A. G. Spaulding & Bro., New York, N. Y.
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 Splendor Electrical Co., Newark, N. J.
 Standard Oil Co. of Indiana, Chicago, Ill.
 Standard Oil Co. of N. J., Newark, N. J.
 Standard Steel Propeller Co., Pittsburgh, Pa.
 Stearman Aircraft Co., Wichita, Kan.
 Stromberg Motor Devices Co., Chicago, Ill.
 Summerill Tubing Co., Bridgeport, Pa.
 Swallow Airplane Mfg. Co., Wichita, Kan.
 Taylor Instrument Companies, Rochester, N. Y.
 The Texas Company, New York, N. Y.
 Thomas-Morse Aircraft Corp., Ithaca, N. Y.
 Thompson Products, Inc., Cleveland, Ohio.
 Thurston Cutting Corp., New York, N. Y.
 Titantone, Inc., Union, N. J.
 Travelair Mfg. Co., Wichita, Kan.
 Travelers Insurance Co., Hartford, Conn.
 Twining & Co., E. S., New York, N. Y.
 U. S. Air Services Pub. Co., Washington, D. C.
 U. S. Hammered Piston Ring Co., Irvington, N. J.
 U. S. Radium Corp., New York, N. Y.
 Valentine & Co., New York, N. Y.
 Varney Aeroplanes, Walter T., San Francisco, Calif.
 Voice of the Sky, Inc., New York, N. Y.
 Chance Vought Corporation, Long Island City, N. Y.
 Welch Aircraft Co., Orin, Anderson, Ind.
 Wellington Sears & Co., New York, N. Y.
 Westinghouse Elec. & Mfg. Co., South Bend, Ind.
 White Dental Mfg. Co., S. S., Philadelphia, Pa.
 Winchester Repeating Arms Co., New Haven, Conn.
 Wolverine Lubricants Co., New York, N. Y.
 Wood & Spencer Co., Cleveland, Ohio.
 Wright Aeronautical Corp., Paterson, N. J.
 Wyman-Gordon Co., Worcester, Mass.

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 E. R. Armstrong.
 W. R. Arthur.
 H. Barber.
 J. B. Beadle.
 David Beecroft.
 A. A. Bigelow.
 Archibald A. Black.
 S. S. Bradley.
 Anton F. Brotz, Sr.
 H. A. Bruno.
 Mrs. Geo. DeForest Brush.
 J. Lansing Callan.
 Harold Caminez.
 B. F. Castle.
 D. E. F. Chandler.
 V. E. Clark.
 Walter A. Colman.
 Fred H. Colvin.
 Henry M. Crane.
 James R. H. Cromwell.
 Glenn H. Curtiss.
 Robert Cuse.
 Ralph S. Damon.
 Richard H. Depew.
 R. Henry Depew.
 W. H. Dey.
 W. H. Dunning, Jr.
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 Sherman M. Fairchild.
 H. C. Ferguson.
 Earl N. Findley.
 Edson F. Gallaudet.
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 Stedman Hanks.
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FLYING OPERATIONS IN THE UNITED STATES DURING 1927

Commercial Operations

	Miles	Passengers	Freight
Aerial Transport Operations.....	3,922,404	12,597	2,307,579
Aerial Service Operators.....	8,341,517	493,567	241,300
Private Flying	197,858	560	.....
Photography	147,960	.....	.....
Total Commercial	12,609,739	476,724	2,548,879

Air Transport Summary

	1927	1926
Operators Reporting	24	19
Planes in Service.....	144	95
Miles Flown	3,922,404	2,025,824
Passengers Carried	12,597	5,782
Freight Carried	2,307,579	1,733,090

Aerial Service Summary

	1927	1926
Operators Reporting	357	420
Planes in Service	768	969
Miles Flown	8,341,517	7,656,492
Passengers Carried	476,724	380,201
Freight Carried	241,300	182,508

Governmental Operations

	Miles, 1927	Miles, 1926
U. S. Post Office	1,320,435*	2,583,056
U. S. Army	14,871,870	16,764,540**
U. S. Navy	10,452,720	8,352,800
Coast Guard	28,960	16,300
Forest Patrol	43,760	.....
Total Government	26,717,745	27,716,696

General Summary

	Miles, 1927	Miles, 1926
Commercial	12,609,739	7,998,240
Government	26,717,745	25,133,640
Grand Total, Miles.....	39,327,484	33,131,880

* Part of service taken over by private operation July 1, and remainder Sept. 1, 1927.

** Includes mileage flown by National Guard.

U. S. AIR CORPS, WAR DEPARTMENT**Organization**

Major General James E. Fechet is Chief of the Air Corps, with office in the Munitions Building, Washington, D. C. The Assistant Chiefs of the Air Corps are Brigadier General Frank P. Lahm, in command of the Training Center, San Antonio, Texas; Brigadier General William E. Gillmore, in charge of the Materiel Division at Dayton, Ohio; and Brigadier General Benjamin D. Foulois, in charge of the Training and Operations Division in Washington, D. C.

In the office of the Chief of the Air Corps is the Executive Officer, Major Delos C. Emmons, as well as the Finance Section in Charge of the Patent Sections in charge of Lieut. Col. R. H. Young and the following divisions:

Training and Operations Division in Washington, under which come the War Plans, Schools, Operations, and Medical Sections.

Materiel Division under which come the following Sections: Experimental Engineering, Procurement, Field Service, Repair and Maintenance, Administration, Industrial War Plans, and Special.

Information Division, which is composed of the Intelligence, Press Relations, Publications, and Photographic Sections. This Division is located in Washington.

Personnel Division, which is in Washington, and is composed of the Commissioned, Enlisted, and Reserve Sections.

Inspection Division, which is in Washington, D. C.

Officers on Duty in Washington

Major General James E. Fechet, Chief of the Air Corps.

Brig. General Benjamin D. Foulois, Assistant Chief of the Air Corps.

Colonel—C. G. Hall.

Lieut. Colonel—Roy C. Kirtland, L. M. Hathaway.

Majors—Henry C. Pratt, Frank M. Kennedy, Frederick L. Martin, Delos C. Emmons, Thomas DeW. Milling, Herbert A. Dargue, Douglas B. Netherwood, Henry W. Harms, John H. Jouett, Carl Spatz, Edwin B. Lyons, Ralph P. Cousins, J. D. Reardan, R. B. Lincoln, J. B. Brooks, J. T. McNarney, H. M. Hickam, L. W. McIntosh, T. J. Hanley, W. S. Woolford.

Captains—Walter F. Kraus, Thomas W. Haste, Frank W. Wright, Ross G. Hoyt, Ralph H. Wooten, Harold M. McClelland, Charles B. B. Bubb, Chilion F. Wheeler, Burdette S. Wright, Elmer E. Adler, Frank O'D. Hunter, Walter J. Reed, R. G. Ervin, Ira C. Eaker, C. T. Phillips.

Lieutenants—Joseph L. Stromme, Arthur K. Ladd, Arthur J. Melanson, Dache M. Reeves, Leland W. Miller, John E. Upston, Ernest E. Harmon, Arthur I. Ennis, John D. Barker, Charles A. Horn, John M. McDonnell, Harold L. George, Howard A. Craig, Charles W. Steinmetz, Donald B. Phillips, Lester J. Maitland, Robert E. Self.

Corps Areas and Departments

FIRST CORPS AREA—Includes States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island, in so far only as coast defense and field operations incident thereto are concerned; that portion of State of New York which lies east of west longitude 72° 30' is attached to First Corps Area; headquarters, Army Base, Boston 9, Mass. Air Corps Officer, Maj. Ira Longenecker.

SECOND CORPS AREA—Includes States of New Jersey, Delaware, and New York, except for certain specific purposes only, that portion thereof which is attached to First Corps Area; headquarters, Governors Island, N. Y. Island of Porto Rico with islands and keys adjacent thereto is attached to Second Corps Area. Air Corps Officer, Col. Theodore A. Baldwin, Jr.

THIRD CORPS AREA—Includes States of Pennsylvania, Maryland, Virginia and District of Columbia, except in so far as concerns troops and agencies of the Regular Army within the territorial limits of District of Washington; headquarters, Standard Oil Building, Baltimore, Md. Air Corps Officer, Major John C. McDonnell.

FOURTH CORPS AREA—Includes North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee, Mississippi and Louisiana; headquarters, Red Rock Building, Atlanta, Ga. Air Corps Officer, Lieut. Col. C. H. Danforth.

FIFTH CORPS AREA—Includes Ohio, West Virginia, Indiana and Kentucky; headquarters, Ft. Hayes, Columbus, Ohio. Air Corps Officer, Lieut. Col. Seth W. Cook.

SIXTH CORPS AREA—Includes Illinois, Michigan, Wisconsin, the post of Jefferson Barracks, Mo., and Arcadia Target Range, Arcadia, Mo.; headquarters, 1819 W. Pershing Road, Chicago, Ill. Air Corps Officer, Capt. E. E. W. Duncan.

SEVENTH CORPS AREA—Includes Missouri, Kansas, Arkansas, Iowa, Nebraska, Minnesota, North Dakota and South Dakota; headquarters, Army Building, Omaha, Neb. Air Corps Officer, Major B. A. Jones.

EIGHTH CORPS AREA—Includes States of Texas, Oklahoma, Colorado, New Mexico, and Arizona, except that portion thereof west of west longitude 114° and south of north latitude 33°, which is attached to the Ninth Corps Area for purposes of administration, training, and tactical control in connection with Border Patrol and field operations incident thereto only; headquarters, Ft. Sam Houston, San Antonio, Texas. Air Corps Officer, Major W. N. Hensley, Jr.

NINTH CORPS AREA—Includes States of Washington, Oregon, Idaho, Montana, Wyoming, Utah, Nevada, and California, and that portion of Arizona which is attached for certain specific purposes only; headquarters, Presidio of San Francisco, Calif. The Territory of Alaska is attached to the Ninth Corps Area. Air Corps Officer, Major H. B. Clagett.

HAWAIIAN DEPARTMENT—Includes all islands belonging to the United States within area between 150° west longitude and 160° east longitude and between 15° south latitude and 30° north latitude; headquarters, Honolulu, Hawaii. Air Corps Officer, Lieut. Col. John H. Howard.

PHILIPPINE ISLANDS—Includes all islands of Philippine Archipelago; headquarters, Manila, P. I. Air Corps Officer, Major Wm. B. Duty.

U. S. FORCES IN CHINA—American Barracks, Tientsin, China.

PANAMA CANAL DEPARTMENT—Includes entire Canal Zone; headquarters, Quarry Heights, Balboa Heights, Canal Zone. Air Corps Officer, Lieut. Col. Arthur G. Fisher.

Matériel Division

Wright Field, Dayton, Ohio

Brig. General William E. Gillmore.

Lieut. Colonel—Harry Graham.

Majors—Alfred H. Hobley, Jacob H. Rudolph, Leslie MacDill, Harold S. Martin, Jacob E. Fickel, C. W. Howard, R. M. Jones.

Captains—William H. Crom, Gerald E. Brower, Oliver P. Echols, Morris Berman, William F. Volandt, William B. Mayer, Theose E. Tillinghast, Oliver S. Ferson, Albert W. Stevens, Robert Kauch, Shiras A. Blair, Robert G. Breene, C. V. Finter, H. V. Hopkins, Edgar P. Sorensen.

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Air Corps Force

Strength of Air Corps, Regular Army, on Dec. 31, 1927.

Officers	1,019	Enlisted Men	9,275
Pilots	932	Civilians	2,841
Students	171		

Strength of Air Corps, Organized Reserves, on Dec. 31, 1927.

Officers	6,827	Pilots	3,699
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Number of civilian employees as of Dec. 31st at

Wright Field	950	Little Rock Air Depot	25
Fairfield Air Depot	411	Panama Air Depot	79
Middletown Air Depot	225	Hawaii Air Depot	26
San Antonio Air Depot	460	Philippines Air Depot	45
Rockwell Air Depot	207		

Air Corps Planes

Number of Airplanes, U. S. Army Air Corps, Dec. 31, 1927, including Organized Reserves.

Attack	1	Training	159
Bombardment	78	Cargo	27
Observation	403		
Photographic	27	Total	868
Pursuit	173		

National Guard

Observation	14	Training	55
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Air Corps Flying

Aircraft hours flown by Army Air Corps during calendar year 1927.

Heavier-than-air	158,546	Lighter-than-air	1,884
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Air Corps Stations

NOTE:—A note in parentheses immediately following the name of post or station indicates the Corps Area, Department Commander or Chief of Branch having jurisdiction over Air Corps troops and activities thereat.

AKRON, OHIO—Balloon Production and Inspection. Procurement Section, District Officer (Chief of Air Corps). P. O., care Goodyear Tire & Rubber Co., Akron, Ohio.

ARMSTRONG, FR.—(H. Dept.). P. O., Honolulu, T. H. Air Depot.

BIGGS FIELD—(Eighth Corps Area). P. O., Ft. Bliss, Texas. Intermediate Landing Field.

- BOLLING FIELD—(Third Corps Area). P. O., Anacostia, D. C. Flying Field. 56th Service Sqdn. *Hdqr. Sqdn.
- BOSTON AIRPORT—(First Corps Area). P. O., Boston, Mass. Corps Area Hdqr. Flight. Intermediate Landing Field. Reserve Flying. Reserve Airdrome.
- BOWMAN FIELD—(Fifth Corps Area). P. O., Louisville, Ky. Intermediate Landing Field. Reserve Airdrome.
- BRISTOL, PA.—(Chief of Air Corps). P. O., Bristol, Pa. Air Corps representative Keystone Aircraft Corp.
- BROOKS FIELD—(Chief of Air Corps). P. O., San Antonio, Texas. 11th School Group. Hdqr. 46th School Sqdn. 62nd Service Sqdn. 51st, 52nd School Sqdns. 20th Photo Section. Flying Cadet Detachment. School of Aviation Medicine. Primary Flying School. Border Patrol Station. Airdrome. Intermediate Landing Field.
- BUFFALO, N. Y.—(Chief of Air Corps). P. O., 398 Ellicott Square, Buffalo, N. Y. Procurement Planning Representative. Air Corps representative Curtis Aeroplane & Motor Corp.
- BURGESS FIELD—(Chief of Air Corps). P. O., Uniontown, Pa. Intermediate Landing Field.
- CHANUTE FIELD—(Chief of Air Corps). P. O., Rantoul, Ill. Technical School. School Troops (Sixth Corps Area). 5th Photo Section.
- CHICAGO, ILL.—(Chief of Air Corps). P. O., 1819 W. Pershing Road, Chicago, Ill. Procurement Planning Representative.
- CLARK FIELD—(P. Dept.). P. O., Camp Stotsenburg, P. I. 3rd Pursuit Sqdn.
- CLARK, FT.—(Eighth Corps Area). P. O., Brackettville, Texas. Airdrome. Intermediate Landing Field.
- CLOVER FIELD—(Ninth Corps Area). P. O., Santa Monica, Cal. Intermediate Landing Field. Reserve Airdrome.
- CRISSY FIELD—(Ninth Corps Area). P. O., Presidio of San Francisco, Cal. 91st Obs. Sqdn. 15th Photo Section.
- CROCKETT, FT.—(Eighth Corps Area). P. O., Galveston, Texas. Hdqr. 3rd Attack Group. 8th, 90th Attack Sqdns. 60th Service Sqdn.
- CROOK, FT.—(Seventh Corps Area). P. O., Ft. Crook, Nebraska. Corps Area Hdqr. Flight. Intermediate Landing Field. Reserve Flying.
- CUMBERLAND LANDING FIELD—(Chief of Air Corps). P. O., Cumberland, Md. Intermediate Landing Field.
- DETROIT, MICH.—(Chief of Air Corps). P. O., 802 Farwell Bldg., Detroit, Mich. Procurement Planning Representative.
- DOUGLAS, ARIZONA—(Eighth Corps Area). P. O., Douglas, Arizona. Airdrome. Intermediate Landing Field.
- DRYDEN, TEXAS—(Eighth Corps Area). P. O., Dryden, Texas. Border Patrol Station. Airdrome. Intermediate Landing Field.
- DUNCAN FIELD—(Chief of Air Corps). P. O., San Antonio, Texas. Air Corps Training Center.
- EDGEWOOD ARSENAL—P. O., Edgewood, Md. Air Corps Detachment.
- FAIRFIELD AIR DEPOT—(Chief of Air Corps). P. O., Fairfield, Ohio. Supply and Repair Depot. Field Service Section.
- FRANCE FIELD—(P. C. Dept.). P. O., France Field, Canal Zone. 6th Composite Group Hdqr. 7th Obs. Sqdn. 12th Photo Sec. 63rd Service Sqdn. 24th Pursuit Sqdn. 25th Bomb. Sqdn. Aerial Coast Defense.
- GARDEN CITY—(Chief of Air Corps). P. O., Long Island, N. Y. Air Corps representative Curtiss Aeroplane & Motor Corp.
- HATBOX FIELD—(Eighth Corps Area). P. O., Muskogee, Oklahoma. Intermediate Landing Field.
- HOUSTON, FT. SAM—(Eighth Corps Area). P. O., Ft. Sam Houston, Texas. 1st Photo Section 12th Obs. Sqdn. Flying Field.
- KELLY FIELD—(Chief of Air Corps). P. O., Kelly Field, Texas. Advanced Flying School. 10th School Group Hdqr. 40th, 41st, 42nd, 43rd School Sqdns. 68th Service Sqdn. 22nd Photo Sec. 39th, 48th School Sqdns. Flying Cadet Detachment.
- KINDLEY FIELD—(P. Dept.). P. O., Ft. Mills, Corregidor, P. I. 2nd Obs. Sqdn.
- LANGLEY FIELD—(Chief of Air Corps). P. O., Hampton, Va. Hdqr. 2nd Wing 19th Airship Co. Hdqr. 2nd Bomb. Group. 20th, 49th, 96th Bomb. Sqdns. 58th, 59th Service Sqdn. 2nd Photo Sec. Tactical School. Flying Field.
- LAREDO—(Eighth Corps Area). P. O., Laredo, Texas. Intermediate Landing Field.
- LEAVENWORTH, FT.—P. O., Ft. Leavenworth, Kansas. Air Corps Det. Intermediate Landing Field.
- LITTLE ROCK AIR DEPOT—(Chief of Air Corps). P. O., Little Rock, Ark. Supply Depot. Flying Field.
- LOGAN FIELD—(Third Corps Area). P. O., Dundalk, Md. Intermediate Landing Field. Flying Field for 104th Obs. Sqdn. Md. Nat'l Guard.
- LOVE FIELD—(Eighth Corps Area). P. O., Dallas, Texas. Intermediate Landing Field.
- LUKE FIELD—(H. Dept.). P. O., Honolulu, Hawaii. Hdqr. 5th Composite Group. 4th Obs. Sqdn. 23rd, 72nd Bomb. Sqdns. 65th Service Sqdn. 11th Photo Section. Aerial Coast Defense.
- LUNKEN AIRPORT—(Fifth Corps Area). P. O., Cincinnati, Ohio. (Station C.) Airdrome. Intermediate Landing Field. Reserve Airdrome.
- MCINTOSH, FT.—(Eighth Corps Area). P. O., Ft. McIntosh, Texas. Intermediate Landing Field.

*Under jurisdiction Chief of Air Corps.

- MARCH FIELD—(Chief of Air Corps). P. O., Riverside, Calif. Primary Flying School. 13th School Group Hdqr. 70th Service Sqdn. 23rd Photo Section. 47th School Sqdn. 53rd, 54th School Sqdns.
- MARFA, CAMP—(Eighth Corps Area). P. O., Marfa, Texas. Airdrome. Intermediate Landing Field.
- MARSHALL FIELD—(Seventh Corps Area). P. O., Ft. Riley, Kansas. 16th Obs. Sqdn. 9th Photo Section.
- MAXWELL FIELD—(Fourth Corps Area). P. O., Montgomery, Ala. 22nd Obs. Sqdn. (Less Det. at Ft. Bragg). 4th Photo Section.
- MIDDLETOWN AIR DEPOT—(Chief of Air Corps). P. O., Middletown, Pa. Repair and Supply Depot. Flying Field.
- MITCHEL FIELD—(Second Corps Area). P. O., Mitchel Field, L. I. Hdqr. 9th Obs. Group. 8th, 14th Photo Sections. 1st, 5th Obs. Sqdns. 61st Service Sqdn.
- NEW YORK—(Chief of Air Corps). P. O., 39 Whitehall St., New York City, N. Y. District Property and Survey Officer. District Office Procurement Section (Matériel Division). Procurement Planning Representative.
- NICHOLS, CAMP—(P. Dept.). P. O., Maricaban, Rizal, P. I. Hdqr. 4th Composite Group. 66th Service Sqdn. 6th Photo Section. 28th Bomb. Sqdn. Philippine Air Depot.
- NORTON FIELD—(Fifth Corps Area). P. O., Columbus, Ohio. Corps Area Hdqr. Flight. Intermediate Landing Field. Reserve Airdrome.
- OFFUTT FIELD—(Seventh Corps Area). P. O., Ft. Crook, Nebr. Corps Area Hdqr. Flight. Intermediate Landing Field. Reserve Flying.
- PEARSON FIELD—(Ninth Corps Area). P. O., Vancouver, Wash. Intermediate Landing Field.
- PHILLIPS FIELD—P. O., Aberdeen Proving Group, Md. Det. 49th Bomb. Sqdn.
- PITTSBURGH AIRPORT—(Third Corps Area). P. O., Pittsburgh, Pa. Airport. Intermediate Landing Field. Reserve Airdrome.
- POPE FIELD—(Fourth Corps Area). P. O., Ft. Bragg, N. C. Det. 22nd Obs. Sqdn. Flying Field.
- POST FIELD—P. O., Ft. Sill, Oklahoma. Det. 12th Obs. Sqdn. Flying Field.
- RICHARDS FIELD—(Seventh Corps Area). P. O., Kansas City, Mo. Intermediate Landing Field. Reserve Airdrome.
- ROCKWELL AIR DEPOT—(Chief of Air Corps). P. O., Rockwell Field, Coronado, Calif. Supply and Repair Depot. Flying Field.
- ROSS FIELD—(Ninth Corps Area). P. O., Arcadia, Calif. Det. 91st Obs. Sqdn. Intermediate Landing Field.
- SAN ANTONIO AIR DEPOT—(Chief of Air Corps). P. O., Duncan Field, San Antonio, Texas. Supply and Repair Depot.
- SAND POINT—(Ninth Corps Area). P. O., Seattle, Wash. Intermediate Landing Field. Reserve Airdrome.
- SAN FRANCISCO—(Chief of Air Corps). P. O., Room 624 Exchange Block, 369 Pine St., San Francisco, Cal. Procurement Planning Representative.
- SANTA MONICA—(Chief of Air Corps). P. O., 2435 Wilshire Blvd., Santa Monica, Cal. District Procurement Office. Production Manager. Air Corps Representative Douglas Aircraft Co.
- SCHOEN FIELD—(Fifth Corps Area). P. O., Ft. Benjamin Harrison, Ind. Intermediate Landing Field. Reserve Airdrome.
- SCOTT FIELD—(Chief of Air Corps). P. O., Scott Field, Belleville, Ill. 8th, 9th, 12th Airship Co's. 21st Airship Group Hdqrs. 21st Photo Section. 24th Airship Service Co. Balloon and Airship School. Air Depot. Cadet Det. Flying Field.
- SEATTLE—(Chief of Air Corps). P. O., care 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. Hdqrs. 1st Pursuit Group. 57th Service Sqdn. 17th, 27th, 94th Pursuit Sqdns. Flying Field.
- SHERIDAN, FT.—(Sixth Corps Area). P. O., Ft. Sheridan, Ill. Corps Area Hdqr. Flight.
- TUSCON—(Eighth Corps Area). P. O., Tucson, Ariz. Airdrome. Intermediate Landing Field.
- WHEELER FIELD—(H. Dept.). P. O., Schofield Barracks, Honolulu, Hawaii. 18th Pursuit Group. 6th, 19th Pursuit Sqdns. Flying Field.
- WOODWARD FIELD—(Ninth Corps Area). P. O., Salt Lake City, Utah. Intermediate Landing Field. Reserve Airdrome.
- WRIGHT FIELD—(Ninth Corps Area). P. O., Dayton, Ohio. Matériel Division. Engineering School. Experimental Engineering Section. Procurement Planning Representative. Repair and Maintenance Section. Industrial War Plans. Field Service Section.
- Organized Reserve Airdrome and Station for Reserve Flying**—Boston Airport, Bowman Field, Clover Field, Lunken Airport, Norton Field, Pearson Field, Pittsburgh Airport, Richards Field, Sand Point, Schoen Field, and Woodward Field.
- Air Depots**—Fairfield, Little Rock, Middletown, Rockwell, San Antonio and 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 and 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

	Organization	P. O. Address
101st	Obs. Sqdn. & Photo Sec., Mass. Nat'l Gd.	Boston Airport, Boston, Mass.
102nd	Obs. Sqdn. & Photo Sec., N. Y. Nat'l Gd.	Miller Field, Staten Island, N. Y.
103rd	Obs. Sqdn., Penna. Nat'l Gd.	Philadelphia, Pa.
104th	Obs. Sqdn. & Photo Sec., Md. Nat'l Gd.	Logan Field, Baltimore, Md.
105th	Obs. Sqdn. & Photo Sec., Tenn. Nat'l Gd.	Blackwood Field, Nashville, Tenn.
106th	Obs. Sqdn. & Photo Sec., Ala. Nat'l Gd.	Roberts Field, Birmingham, Ala.
107th	Obs. Sqdn. & Photo Sec., Mich. Nat'l Gd.	Route 9, Box 453, Detroit, Mich.
108th	Obs. Sqdn., Illinois Nat'l Gd.	Chicago, Ill.
109th	Obs. Sqdn. & Photo Sec., Minn. Nat'l Gd.	Chamberlain-Wold Field, St. Paul, Minn.
110th	Obs. Sqdn. & Photo Sec., Mo. Nat'l Gd.	Anglum Field, St. Louis, Mo.
111th	Obs. Sqdn. & Photo Sec., Texas Nat'l Gd.	Ellington Field, Houston, Texas.
112th	Obs. Sqdn., Ohio Nat'l Gd.	Cleveland, Ohio.
113th	Obs. Sqdn. & Photo Sec., Ind. Nat'l Gd.	Indianapolis, Ind.
115th	Obs. Sqdn. & Photo Sec., Calif. Nat'l Gd.	Los Angeles Airport, Griffith Park, Cal.
116th	Obs. Sqdn. & Photo Sec., Wash. Nat'l Gd.	Parkwater Aviation Field, Spokane, Wash.
118th	Obs. Sqdn. & Photo Sec., Conn. Nat'l Gd.	Municipal Airdrome, Hartford, Conn.
120th	Obs. Sqdn. & Photo Sec., Colo. Nat'l Gd.	Lowry Field, Denver, Colo.
154th	Obs. Sqdn., Arkansas Nat'l Gd.	Little Rock, Ark.

District Procurement Representatives

Buffalo.	Wright Field.
Chicago.	New York.
Detroit.	San Francisco.

ARMY PURCHASES OF AERONAUTICAL EQUIPMENT

Aircraft

No.	Types	Cost
	Lighter-than-Air Equipment	\$ 198,251.00
70	Primary Training Airplanes and Spares.	685,691.16
40	Advanced Training Airplanes and Spares.	599,799.44
50	Pursuit Airplanes and Spares.	1,668,384.35
9	Amphibian Airplanes and Spares.	324,411.76
45	Observation Airplanes and Spares.	1,079,416.32
40	Attack Airplanes and Spares.	1,230,113.22
10	Cargo Airplanes and Spares.	327,460.60
5	Supercharged Pursuit Airplanes and Spares.	181,802.95

Engines and Spares

*215	Curtiss D-12 Engines.	\$1,934,682.64
*12	Wright J-5 Engines.	79,241.86
*60	Liberty Engines Remodeled.	43,035.00
*90	Wright "E" Engines Remodeled.	65,301.11
*18	Liberty Engines, Inverted Type, Remodeled.	40,696.00
15	Liberty Engines, Inverted Type, Remodeled.	30,000.00
26	Pratt & Whitney Wasp Engines.	221,755.00
10	Liberty Engines, Inverted Type, Remodeled.	4,634.65
2	Curtiss VG-1550 Geared Engines.	36,400.00
3	Curtiss VG-1550 Direct Drive Engines.	45,360.00
5	Pratt & Whitney Hornet Engines.	79,940.00
5	Wright Cyclone Engines.	79,940.00
90	Liberty Engines, Remodeled.	64,552.50
7	Wright J-5 Engines.	30,943.64

*These engines are initial equipment for airplanes listed above.

Accessories

No.	Types	Cost
225	Propellers, Metal	\$ 114,568.00
18	Propellers, Wood	3,229.25
24	Superchargers and Parts.	51,234.50
415	Parachutes, Seat Type.	132,696.25
25	Parachutes, Training Type.	15,987.50
	Government Furnished Equipment for (25) Bombardment Airplanes.	125,296.16
250	Hand and Electric Starters.	124,042.50
6	Cameras, K-3A	33,540.00
27	Cameras, K-6, Remodeled.	22,796.10
	Spare Parts for O-2 Observation Airplanes.	96,548.25
	Spare Parts for P-9 Pursuit Airplanes.	50,825.00
1250	Goggles, Aviators	14,115.50

2050	Summer Flying Suits.....	10,250.00
2050	Helmets, Aviators'.....	7,595.00
—	Airplane Equipment and Accessories.....	184,298.96
—	Power Plant Equipment and Accessories.....	113,803.42
—	Photographic Equipment.....	13,567.50
—	Life-Saving Equipment.....	1,125.00
—	Flying Equipment, Face Masks, Goggles, Clothing, etc.....	7,647.36

BUREAU OF AERONAUTICS, NAVY DEPARTMENT

Organization

The Bureau of Aeronautics of the Navy Department was established August 10, 1921. The following organization carries on the duties of the Bureau: the Chief of the Bureau, the Assistant Chief of the Bureau, and the four following divisions: (a) Plans, (b) Administration, (c) Material, (d) Flight.

Duties have been distributed as follows: The Plans Division deals with the planning of the work of the Bureau, the formulation of plans of war in conjunction with the Planning Section of the Office of Naval Operations, recommendations concerning types of aircraft which are necessary for Naval Aviation. The Administration Division handles all civilian personnel employees under the jurisdiction of the Bureau, and keeps a record of and approves of the expenditure of funds allotted to the Bureau. The Material Division has under its jurisdiction all matters pertaining to the design of aircraft. The Flight Division has under its cognizance all matters pertaining to the operation of naval aircraft, training of personnel, aviation photography and aerology.

Officers on Duty in the Bureau of Aeronautics, Navy Department

Chief of Bureau.....Rear Admiral W. A. Moffett, O.
 Assistant Chief of Bureau.....Captain E. S. Land (CC), O.
 Administration—Lt. Comdr. W. D. Thomas, N.A.
 Financial—Captain J. H. Gunnell (SC), U.S.N.
 Plans Division—Commander N. H. White, Jr., N.A.; Lt. Comdr. B. G. Leighton, N.A.; Lt. Comdr. V. H. Ragsdale, N.A.; Lieut. J. L. Cotten, N.A.; and Lieut. J. Perry, N.A.
 Flight Division—Lt. Comdr. G. A. Smith, N.A.; Lt. Comdr. G. Morgan, N.A.; Lieut. A. P. Flagg, N.A.; Lieut. C. R. Brown, N.A.; and Lieut. F. W. Reichelderfer, N.A.
 Material Division—Captain H. C. Richardson (CC), N.A.; Commander E. M. Pace (CC); Commander Garland Fulton (CC), O.; Commander S. M. Kraus, O.; Commander S. J. Zeigler (CC); Lt. Comdr. L. C. Stevens (CC), N.A.; Lt. Comdr. J. M. Shoemaker, N.A.; Lt. Comdr. H. R. Oster (CC); Lt. Comdr. C. H. Havill, N.A.; Lt. Comdr. A. C. Davis, N.A.; Lieut. William Fellers, N.A.; Lieut. A. Soue-k, N.A.; Lieut. E. P. Moore, N.A.; Lieut. W. S. Diehl (CC); Lieut. L. Harrison (CC), F.O.; Lieut. C. B. Harper (CC), O.; Lieut. T. C. Lonquest, N.A.; Lieut. A. I. Price, N.A.; Lieut. J. B. Sykes, N.A.; Lieut. A. J. Williams, N.A.; Lieut. R. H. Harrell, N.A.; Lieut. C. M. Huntington, N.A.
 Information Section—Captain H. C. Major, U.S.M.C., N.A.
 Marine Corps Aviation—Major E. H. Brainard, U.S.M.C., N.A.; Captain L. E. Woods, U.S.M.C., N.A.; and Captain F. O. Rogers, U.S.M.C., N.A.

Naval Air Stations

Pensacola, Fla., Training—Commandant, Rear Admiral F. B. Upham, S.N.A.; Captain of Yrd, Commander W. G. Child, N.A.
San Diego, Calif., Fleet Base—Commanding Officer, Captain F. R. McCrary, N.A.; Executive Officer, Lt. Comdr. A. E. Montgomery, N.A.
Hampton Roads, Va., Fleet Base—Commanding Officer, Commander A. C. Read, N.A.; Executive Officer, Lt. Comdr. J. F. Moloney, N.A.
Lakehurst, N. J., Lighter-than-Air—Commanding Officer, Captain E. S. Jackson, S.N.O.; Executive Officer, Lt. Comdr. M. A. Pierce, N.A. (LTA).
Pearl Harbor, T. H., Fleet Base—Commanding Officer, Commander V. E. Herbster, N.A.; Executive Officer, Lieut. F. R. McDonnell, N.A.
Coco Solo, C. Z., Fleet Base—Commanding Officer, Lieut. Comdr. F. M. Maile, N.A.; Executive Officer, Lieut. W. N. Updegraff, N.A.
Anacostia, D. C., Experimental—Commanding Officer, Lieut. Comdr. H. C. Wick, N.A.; Executive Officer, Lieut. Comdr. D. C. Watson, N.A.
Rockaway, L. I., N. Y., Naval Aviation Reserve Unit—Commanding Officer, Lieut. J. W. Iseman, U.S.N.R.F., N.A.
Sand Point, Wash., Naval Aviation Reserve Unit—Commanding Officer, Lieut. Comdr. J. H. Campman, N.A.
Great Lakes, Ill., N.A.R.U.—C. O., Lieut. P. E. Gillespie, U.S.N.R.F., N.A.
Squantum, Mass., N.A.R.U.—C. O., Lieut. R. D. Thomas, U.S.N.R.F., N.A.

Aircraft Squadrons

Aircraft Squadrons, Scouting Fleet—Commander, Rear Admiral J. J. Raby, N.A.; Senior Aide, Capt. E. S. King, N.A.
Observation Plane Squadron Three—Squadron Commander, Lt. Comdr. M. B. Stonestreet, N.A.; Executive Officer, Lieut. G. T. Owen, N.A.

Observation Plane Squadron Five—Squadron Commander, Lt. Comdr. H. C. Frazier, N.A.; Executive Officer, Lieut. H. E. Halland, N.A.
 Torpedo and Bombing Squadron Nine—Squadron Commander, Lt. Comdr. Wadleigh Capehart, N.A.; Executive Officer, Lieut. G. D. Townsend, N.A.
 Utility Squadron Two—Squadron Commander, Lt. Comdr. K. McGinnis, N.A.; Executive Officer, Lieut. R. W. Bockius, N.A.
 U. S. S. *Wright* (tender) (Flagship)—Commanding Officer, Capt. E. S. King, N.A.; Executive Officer, Lt. Comdr. H. B. Cecil, N.A.
 U. S. S. *Patoka*—Commanding Officer, Capt. C. W. Early.
 U. S. S. *Sandpiper* (tender)—Commanding Officer, Lieut. A. S. Dorsey.
 U. S. S. *Teal* (tender)—Commanding Officer, Lieut. F. J. Legere.
Aircraft Squadrons, Battle Fleet—Commander, Rear Admiral J. M. Reeves, O.; Senior Commander, Commander E. E. Wilson, N.A.
 Observation Plane Squadron One—Squadron Commander, Lt. Comdr. C. T. Durgin, N.A.; Executive Officer, Lieut. T. L. Sprague, N.A.
 Observation Plane Squadron Two—Squadron Commander, Lt. Comdr. D. B. Duncan, N.A.; Executive Officer, Lieut. B. H. Wyatt, N.A.
 Observation Plane Squadron Four—Squadron Commander, Lieut. R. S. Taylor, N.A.; Executive Officer, Lieut. F. L. Rhea, N.A.
 Fighting Plane Squadron One—Squadron Commander, Lt. Comdr. G. F. Bogan, N.A.; Executive Officer, Lieut. C. W. Wieber, N.A.
 Fighting Plane Squadron Two—Squadron Commander, Lt. Comdr. G. F. Chapline, N.A.; Executive Officer, Lieut. H. M. Martin, N.A.
 Fighting Plane Squadron Three—Squadron Commander, Lieut. G. T. Cuddihy, N.A.; Executive Officer, Lieut. G. R. Henderson, N.A.
 Fighting Plane Squadron Five—Squadron Commander, Lt. Comdr. O. B. Hardison, N.A.; Executive Officer, Lieut. W. M. Dillon, N.A.
 Fighting Plane Squadron Six—Squadron Commander, Lt. Comdr. J. E. Ostrander, N.A.; Executive Officer, Lieut. D. W. Tomlinson, N.A.
 Torpedo and Bombing Plane Squadron One—Squadron Commander, Lt. Comdr. H. St. Clair Sease, N.A.; Executive Officer, Lieut. H. S. Kendall, N.A.
 Torpedo and Bombing Plane Squadron Two—Squadron Commander, Lt. Comdr. H. R. Bogusch, N.A.; Executive Officer, Lt. Comdr. A. P. Schneider, N.A.
 Utility Squadron One—Squadron Commander, Lt. Comdr. O. W. Erickson, N.A.; Executive Officer, Lieut. J. C. Cronin, N.A.
 U. S. S. *Saratoga* (Aircraft Carrier) (Flagship)—Commanding Officer, Captain H. E. Yarnell, O.; Executive Officer, Commander Kenneth Whiting, N.A.
 U. S. S. *Lexington* (Aircraft Carrier)—Commanding Officer, Captain A. W. Marshall, N.A.; Executive Officer, Commander T. G. Ellyson, N.A.
 U. S. S. *Langley* (Aircraft Carrier)—Commanding Officer, Commander J. H. Towers, N.A.; Executive Officer, Commander R. R. Paunack, N.A.
 U. S. S. *Arctostook* (tender)—Commanding Officer, Lt. Comdr. A. D. Bernhard, N.A.; Executive Officer, Lt. Comdr. Roy Pfaff.
 U. S. S. *Gannet* (tender)—Commanding Officer, Lieut. Thos. Macklin.
Aircraft Squadrons, Asiatic Fleet—Commander, Commander R. K. Turner, N.A.
 Observation Plane Squadron Eleven—Squadron Commander, Lieut. J. J. Ballentine, N.A.
 Torpedo and Bombing Plane Squadron Five—Squadron Commander, Lt. Comdr. G. D. Price, N.A.

Airship

U. S. S. *Los Angeles*—Commanding Officer, Lt. Comdr. C. E. Rosendahl, N.A.; Executive Officer, Lt. Comdr. H. V. Wiley, N.A.

Aviation Duty Other Than Department Stations and Squadrons

Naval Torpedo Station, Newport, R. I.—Lieut. J. F. Bolger, N.A.
 Naval Aircraft Factory, U. S. Navy Yard, Philadelphia, Pa.—Manager, Commander R. D. Weyerbacher (CC), U. S. N., N.A.; Executive Officer, Lt. Comdr. J. H. Strong, N.A.
 Naval Air Detail, Dahlgren, Va.—Officer in Charge, Lieut. V. H. Schaeffer, N.A.
 Aviation Mechanics' School, Naval Training Station, Great Lakes, Ill.—Lieut. M. C. Faber (CC).
 Aide to Assistant Secretary of the Navy for Aeronautics, Navy Dept., Washington, D. C.—Lt. Comdr. W. K. Harrill, N.A.
 Bureau of Navigation, Navy Dept., Washington, D. C.—Lieut. F. W. Neilson, N.A.
 Hydrographic Office, Navy Dept., Washington, D. C.—Lieut. E. F. Burkett, N.A.
 Bureau of Ordnance, Navy Dept., Washington, D. C.—Lt. Comdr. S. Picking, F.O.
 Bureau of Engineering, Navy Dept., Washington, D. C.—Lieut. S. L. LaHache, N.A.
 Aide to CinC, Staff U. S. Fleet—Lt. Comdr. D. C. Ramsay, N.A.
 Aide to CinC, Staff, Battle Fleet—Lt. Comdr. G. D. Murray, N.A.
 Office of Naval Operations, Navy Dept., Washington, D. C.—Commander P. N. L. Bellinger, N. A. (Fleet Training.)

Naval Aviation Forces

Strength of Naval Aviation forces as of December 31st, divided as follows: Officers, Pilots, Students, Enlisted Men, Civilians.

OFFICERS

Navy

Commissioned Officers	596	
Warrant Officers	70	666

Marine Corps

Commissioned Officers	82	
Warrant Officers	10	92

Grand Total Officers..... 758

PILOTS—Navy

Qualified Aviators

Commissioned Officers	447	
Warrant Officers	23	470

Naval Aviation Pilots

(Enlisted Men)	124	
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Total Pilots, Navy..... 594 594

PILOTS—Marine Corps

Qualified Aviators

Commissioned Officers	58	
Warrant Officers	2	60

Naval Aviation Pilots

(Enlisted Men)	26	
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Total Pilots, Marines..... 86 86

Grand Total Pilots..... 680

STUDENTS 75

ENLISTED MEN—Navy 6,952

Marines 906

Total 7,858

CIVILIANS 2,316

Number of classified civil employees as of Dec. 31 at:

(a) Naval Aircraft Factory, Philadelphia.....	132
(b) Naval Air Station, Pensacola, Fla.....	33
(c) Naval Air Station, Lakehurst, N. J.....	21
(d) Naval Air Station, San Diego, Cal.....	13
(e) All other Naval Air Stations, where design, repair, etc., are carried on: Naval Air Station, Hampton Roads.....	1

Naval Planes

Number of serviceable planes in Naval Aviation as of Dec. 31st, divided as to pursuit, observation, torpedo, patrol, scouting, and bombardment:

Pursuit (Fighting)	120
Observation	135
Torpedo-Scouting-Bombing	175
Patrol	3
Total	442

NOTE:—This includes service types which are serviceable or obsolescent. It does not include obsolete and experimental planes.

Hours and Miles of Flying

Number of hours and miles flown by heavier-than-air Naval aircraft: (a) At air-dromes; (b) At sea with fleets; (c) Cross country or cross water:

(a) At air-dromes

Hours	82,391.30
Miles	6,591,280

(b) At sea with fleets

Hours	36,994.95
Miles	2,959,600

(c) Cross country or cross water

Hours	13,772.85
Miles	1,101,840

AIRCRAFT, ENGINES AND EQUIPMENT PURCHASED

Tabulation of number, types and costs of aircraft, engines and accessories contracted for and procured during fiscal year:

		Aircraft Types	Cost
No.			
100	Fighters		\$1,951,194.27
	Spares		389,466.95
53	Observation Planes		1,034,568.00
	Spares		177,775.00
85	Primary Training Planes		800,004.00
	Spares		148,824.00
66	Torpedo Planes		2,309,934.00
	Spares		393,001.00
12	Experimental Planes		520,715.00
Engines			
239	410 H. P. Aircooled Engines		\$2,689,367.00
	Spares		538,616.00
205	200 H. P. Aircooled Engines		1,262,547.00
	Spares		248,818.00
8	450 H. P. Water Cooled Engines and spare parts (3A-1500)		139,894.00
81	500 H. P. Aircooled Engines		981,606.00
	Spares		196,121.00
48	500 H. P. Aircooled Engines		610,099.00
	Spares		121,650.00
14	Experimental Engines		332,850.00
Accessories			
550	Parachutes		\$ 153,960.00
24	Life Rafts		624.64
77	Starters		43,600.00
	Instruments		200,000.00
	Propellers		197,000.00
	Generators		48,424.00
	Batteries		8,631.00

MARINE CORPS, NAVY DEPARTMENT

Organization

Headquarters, U. S. Marine Corps, Washington, D. C.:

Officer in Charge, Marine Corps Aviation—Major Edwin H. Brainard, N.A.
 Personnel Officer—Captain Louis E. Woods, N.A.
 Material Officer—Captain Ford O. Rogers, N.A.

Aircraft Squadrons, ECEF, Quantico, Va.:

Commanding Officer—Major Charles A. Lutz, N.A.

Squadron Commanders

Fighting Plane Squadron.....	8-M	1st Lieut. L. H. M. Sanderson, N.A.	
Fighting Plane Squadron.....	9-M	1st Lieut. W. O. Brice, N.A.	
Utility Squadron	6-M	Major L. M. Bourne, N.A.	
Service Squadron	1-M	Captain W. E. McCaughtry, N.A.	

Aircraft Squadrons, 2nd Brigade Marines, Nicaragua:

Commanding Officer—Major Ross E. Rowell, N.A.

Squadron Commanders

Observation Plane Squadron.....	6-M	Captain W. C. Byrd, N.A.
Observation Plane Squadron.....	7-M	Captain R. J. Archibald, N.A.

Aircraft Squadrons, 3rd Brigade Marines, China:

Commanding Officer—Lieut. Col. T. C. Turner, N. A.

Squadron Commanders

Fighting Plane Squadron.....	10-M	1st Lieut. W. J. Wallace, N.A.
Observation Plane Squadron.....	10-M	Captain J. T. Moore, N.A.

Observation Plane Squadron 8-M, NAS, San Diego, Calif.:

Commanding Officer—Captain H. D. Campbell, N.A.

Observation Plane Squadron 9-M, 1st Brigade Marines, Haiti:

Commanding Officer—Captain R. A. Presley, N.A.

Patrol Squadron 3-M, Sumay, Guam, M. I.:

Commanding Officer—1st Lieut. J. H. Strother.

(This Squadron is skeletonized—main personnel being on detached duty in China.)

TOTAL HOURS FLOWN, 19,000 Approx. TOTAL MILES FLOWN, 1,800,000 Approx.

(No casualties).

Personnel

	<i>Aviators</i>	<i>Students</i>	<i>Staff</i>	<i>Total</i>
Officers	58	18	23	99
	<i>Aviation Pilots</i>	<i>Students</i>	<i>General</i>	<i>Total</i>
Enlisted	27	6	875	908

Type and Number of Aircraft

							<i>Total</i>
O2B-1	FB-1	F6C-1	F6C-3	F6C-4	NY-1	Observation	32
16	9	3	7	4	2	Fighting	27
OL-6	OD-1	TA-1	O2U-1	NB-1	F8C-3	Training	5
8	2	3	6	3	4	Transports	3
							67

STRENGTH OF THE UNITED STATES AIR FORCES

	<i>Officers</i>	<i>Aviators</i>	<i>Students</i>	<i>Enlisted Men</i>	<i>Civilians</i>	<i>Total</i>
Army	1,019	932	171	9,275	2,841	14,238
Air Corps Reserve	6,827	3,699	...	...	...	10,526
Navy	666	594	75	6,952	2,316	10,603
Marine Corps	99	85	24	908	...	1,116

AIR EQUIPMENT, UNITED STATES

<i>Army</i>		<i>Navy</i>	
Bombardment	78	Fighting	129
Observation	417	Observation	135
Pursuit	173	Torpedo-Scouting-Bombing	175
Attack	1	Patrol	3
		Marines (Observation and Fighting)....	59
Total	669	Total	501

In addition to the above the War Department reports 27 photographic, 157 training and 27 cargo airplanes. The Marine Corps, 5 training and 3 transport planes. The Navy does not report these types of planes.

DIPLOMATIC SERVICE OF THE UNITED STATES

Army

London	Maj. H. R. Harmon, A.C., Assistant Military Attaché.
Paris and Madrid	Maj. B. K. Yount, A.C., Assistant Military Attaché.
Rome	Maj. Geo. E. Lovell, Assistant Military Attaché.
Berlin	Maj. Geo. E. Reinburg.

Navy

London	Lt. Comdr. R. D. Kirkpatrick. (Also accredited to Paris, The Hague, Berlin, Madrid and Lisbon).
Rome	Lt. Comdr. Ralph F. Wood.

DIPLOMATIC SERVICE TO THE UNITED STATES

France	Maj. Georges Thenault, Assistant Military Attaché for Aviation.
Great Britain	Wing Comdr. T. G. Hetherington, Air Attaché.
Italy	Comdr. Silvio Scaroni, Air Attaché.
Spain	Maj. Victor Casajus, Military Attaché for Aviation.

DEPARTMENT OF COMMERCE

Aeronautics Branch

WILLIAM P. MACCRACKEN, JR., Assistant Secretary for Aeronautics

Office of the Assistant Secretary:

Joan C. Murphy.....	Secretary to Assistant Secretary.
Ella C. Linehan.....	Clerk-Stenographer.

Office of the Director of Aeronautics:

Clarence M. Young.....	Director of Aeronautics.
Christine S. Fox.....	Secretary to Director.
George T. Ash.....	Chief of Administrative Section.

Air Regulations Division:

Daniel deR. M. Scarritt.....Acting Chief.
 Louis H. Bauer.....Medical Director.
 Clarence L. Ofenstein.....Chief of Engineering Section.
 Elmer E. Kintz.....Chief of Violations Section.
 Jesse W. Lankford.....Chief of Licensing Section.
 Ralph G. Lockwood.....Supervising Inspector.
 Richard C. Gazley.....Aeronautical Engineer.

INSPECTORS

Boggs, Marshall S.	Eielson, Carl B.	Lees, Richard H., Jr.
Breingan, Wm. H.	Frese, Henry A.	Mouton, Edison E.
Brooke, Walter A.	Gast, Robert H.	Parking, Walter F.
Budwig, Gilbert G.	Green, Wayne S.	Price, John H.
Braukman, Clarence A.	Jerdone, Frank H.	Richardson, Durston G.
Cramer, Parker D.	Johnson, James M.	Sargent, Winthrop O.
Charles, Chester A.	Jones, W. R.	Willits, Sanford L.
Cutrell, Ernest A.	Kelly, James N.	Wilson, Leo C.
Day, Ewing W., Jr.	Kinney, James L.	

Airways Division:

Fred C. Hingsburg.....Chief Engineer.
 C. I. Stanton.....Assistant.
 Arthur J. LaBaie.....Airways Engineer.
 George E. Stratton.....Associate Engineer.
 Hoy J. Walls.....Radio Engineer.
 William E. Jackson.....Associate Radio Engineer.
 Eugene Sibley.....Radio Traffic Supervisor.

AIRWAYS EXTENSION SUPERINTENDENTS

Bert H. Creighton	J. P. Worthington	Gerald R. FitzGerald
George C. Miller	Thos. B. Bourne	John E. Sommers
William T. Miller	Walter O. Snyder, Jr.	A. P. Taliaferro, Jr.
Alvin W. Smith	Edward M. Haight	A. H. Wait
John Bonforte	Alvin O. Preil	Herman W. Lucas
Thos. H. Chapman	Walter L. Avery	William J. Mackenzie
	William F. Centner	

INSPECTORS OF AIRWAYS CONSTRUCTION

Carl L. Christiansen	Phillip Jackson	Carl Schanche
George P. Davis	Jay A. Mount	William E. Thomas
Perry S. McLain	Merle M. North	Milton W. Wilson
Francis A. O'Leary	Irl H. Polk	

Air Information Division:

Ernest L. Jones.....Chief.
 Donald E. Keyhoe.....Assistant Chief.
 Harry H. Blee.....Senior Business Specialist.
 R. S. Moore.....Airplane and Engine Inspector.
 Stafford Kernan.....Aeronautic Information Clerk.
 John Groves.....Aeronautic Observer.

Air Mapping Section, Coast and Geodetic Survey:

Raymond S. Patton.....Chief.

Aeronautical Research Division, Bureau of Standards:

J. H. Dellinger.....Chief.

SURVEYING AND LIGHTING IN 1927

Following is a compilation of surveying and lighting accomplished during the calendar year 1927.

SURVEY:

Atlanta-New York Airway.....	763	miles
Pueblo-Cheyenne Airway.....	200	"
Boise-Pasco Airway.....	124	"
Chicago-Twin Cities Airway (Partial).....	365	"
Los Angeles-San Francisco Airway.....	402	"
San Francisco-Portland Airway (Partial).....	200	"
San Francisco-Salt Lake City (Partial).....	135	"
Louisville-Cleveland Airway.....	345	"
Total	2,534	"

LIGHTED:

Atlanta-New York Airway.....	763	miles
Chicago-Dallas Airway (Partial).....	400	"
Pueblo-Cheyenne Airway.....	200	"
Boise-Pasco Airway.....	124	"
Chicago-Twin Cities Airway (Partial).....	365	"
St. Louis-Chicago Airway.....	277	"
Total	2,129	"

STATUS OF AIRWAY MARKING AND LIGHTING

Route	June 30, 1927				Dec. 31, 1927				June 30, 1928			
	Rotating Beacons	Acetylene Beacons	Arrow Markers	Intermediate Fields	Rotating Beacons	Acetylene Beacons	Arrow Markers	Intermediate Fields	(Estimated)			
Transcontl.	185	427	0	92	185	427	0	92	247	460	62	112
N. Y.-Boston..	19	4	19	3	19	4	19	3	19	4	19	3
St. Louis-Chi..	24	0	24	9	24	0	24	9	24	0	24	9
Dallas-Chi.	74	8	74	20	74	8	74	20	74	38	74	20
Pueblo-Chey. .	16	9	16	6	16	9	16	6	16	9	16	6
S. Lake-Pasco.	1	20	0	0	1	20	0	0	41	20	41	13
L. A.-S. Lake.	21	2	21	7	21	2	21	7	41	10	41	17
Los. A.-Seattle	0	0	0	0	35	3	35	8	52	10	52	13
Atlanta-N. Y..	0	0	0	0	59	2	59	13	78	2	78	19
L'ville-Clev. .	0	0	0	0	0	0	0	0	33	3	33	11
Chi.-T. Cities..	0	0	0	0	29	2	29	9	29	2	29	9
Total	340	470	154	137	493	477	277	167	654	558	469	232

Marked and lighted airways, miles.....	4,121	5,500	7,512
Marked airways, miles.....	0	125 ¹	725 ²

¹LaCrosse-Twin Cities.

²Also includes Redding, California, to Seattle, Washington, and Salt Lake City to Burley, Idaho.

STRIP AIR MAPS

The strip maps of airways available from the Aeronautic Branch of the Department of Commerce comprise a series of maps by the Department of Commerce, Air Corps maps of the Army and a series of strips prepared by the Hydrographic Office of the Navy. The Department of Commerce and Air Corps maps may be obtained for 35c and the Hydrographic Office maps for 20c. The following is a list of maps now available:

Department of Commerce Maps—(102) Dallas to Oklahoma City; (107) New Orleans to Jackson, Miss.; (111) Chicago to Milwaukee.

Air Corps Maps—(1) Uniontown to Dayton; (2) Washington to Uniontown; (3) Washington to New York; (4) Washington to Norfolk; (5) Dayton to Rantoul; (6) New York to Boston; (7) Beaumont to New Orleans; (8) New Orleans to Montgomery; (9) Chicago to Iowa City; (10) Iowa City to Omaha; (11) Omaha to North Platte; (12) North Platte to Cheyenne; (13) Cheyenne to Rock Springs; (14) Rock Springs to Salt Lake City; (15) Montgomery to Augusta; (16) Augusta to Fayetteville; (18) Fayetteville to Norfolk; (19) New York to Bellefonte; (20) Bellefonte to Cleveland; (21) Cleveland to Chicago; (22) Chicago to Rantoul to St. Louis; (23) St. Louis to Kansas City; (24) Kansas City to Muskogee; (25) Muskogee to Dallas; (26) Dallas to San Antonio; (27) San Antonio to Beaumont; (28) San Antonio to Dryden; (29) Dryden to El Paso; (30) El Paso to Tucson; (31) Tucson to Phoenix; (32) Phoenix to San Diego; (33) Salt Lake City to Elko; (34) Elko to Reno; (35) Reno to San Francisco; (36) Dayton to Louisville; (37) Louisville to St. Louis; (38) San Diego to Tucson; (39) San Diego to Los Angeles; (40) Los Angeles to Yreka; (44) Detroit to Rantoul; (45) Detroit to Cleveland to Pittsburgh to Uniontown; (46) Washington to Middletown; (47) Detroit to Dayton; (49) Louisville to Nashville.

Hydrographic Office Maps—New York to Philadelphia; Philadelphia to Norfolk; Washington to Norfolk; Norfolk to Moorhead City; Moorhead City to Winyah Bay; Winyah Bay to Savannah; Savannah to Daytona; Daytona to Miami; Miami to Key West; Key West to Tampa; Tampa to St. Marks; St. Marks to Jacksonville; St. Marks to Pensacola; Pensacola to New Orleans; Key West to Mariel, Cuba; Cienfuegos to Santa Cruz del Sur, Cuba; Santa Cruz del Sur to Cape Maxxi; Guantanamo to Port au Prince, Haiti.

AIRWAYS BULLETINS

[Asterisk (*) indicates Department of Commerce intermediate field.]

Bulletin No.

- *1. Bloomfield, Iowa.
2. Springfield, Ill., Conkling Field.
- *3. Framingham, Mass.
4. Uniontown, Pa., Burgess Field.
- *5. Unionville, Mo.
6. Peoria, Ill., Peoria Airport.
7. Boston, Mass., Boston Airport.
8. Saugus, Mass., Groah Field.
9. Meteorological stations.
10. Use of wind roses.
11. Strip maps, list of.
12. Galveston, Texas, Fort Crocker Air-dome.
13. Tallulah, La.
14. Springfield, Vt., Springfield Airport.
15. El Paso, Tex. (Fort Bliss), Biggs Field.
16. New Orleans, La., Alvin Calender Field.
17. Hashbrouck Heights, N. J., Teterboro Airport.
18. Altoona-Tyrone, Pa., Altoona-Tyrone Airport.
19. Hot Springs, Ark., Hot Springs Airport.
- *20. Libertyville, Iowa.
- *21. Oxford, Kan.
- *22. Plainfield, Ill.
- *23. Eliza, Ill.
24. Changes.
25. New York-Boston Airway.
26. Marysville, Mich., Marysville Airport.
27. Los Angeles, Calif., Dyer Field.
28. Los Angeles, Calif., Griffith Park.
- *29. Mason City, Ill.
30. Rio Grande, Tex., Fort Ringgold.
- *31. Lowder, Ill.
- *32. Buffalo, N. Y., Buffalo Airport.
- *33. Godfrey, Ill.
34. Connecticut—Meteorological conditions.
35. Alabama—Meteorological conditions.

36. Massachusetts—Meteorological conditions.
37. Florida—Meteorological conditions.
38. Idaho—Meteorological conditions.
39. Illinois—Meteorological conditions.
40. Indiana—Meteorological conditions.
41. Arizona—Meteorological conditions.
42. Nevada—Meteorological conditions.
43. Nebraska—Meteorological conditions.
44. Maryland—Meteorological conditions.
45. Maine—Meteorological conditions.
46. Kentucky—Meteorological conditions.
47. Kansas—Meteorological conditions.
48. Iowa—Meteorological conditions.
49. Delaware—Meteorological conditions.
50. Michigan—Meteorological conditions.
51. New Mexico—Meteorological conditions.
52. Vermont—Meteorological conditions.
53. Utah—Meteorological conditions.
54. Texas—Meteorological conditions.
55. Tennessee—Meteorological conditions.
56. South Dakota—Meteorological conditions.
57. New Hampshire—Meteorological conditions.
58. Missouri—Meteorological conditions.
- *59. Leonore, Ill.
60. Muenster, Texas.
61. Garden City, N. Y., Curtiss Field.
62. Reading, Pa., Reading Airport.
- *63. La Rose, Ill.
- *64. Morris, Ill.
- *65. Pernell, Okla.
66. Kansas City, Mo., Richards Field.
67. West Virginia—Meteorological conditions.
68. Virginia—Meteorological conditions.
69. Pennsylvania—Meteorological conditions.
70. Oregon—Meteorological conditions.
71. North Dakota—Meteorological conditions.

72. Colorado—Meteorological conditions.
73. Miami, Okla., Miami Airport.
74. Changes.
- *75. Edmond, Okla.
- *76. Criner, Okla.
- *77. Chesterfield, Ill.
- *78. Bethany, Conn.
- *79. Blackwell, Okla.
80. Salina, Kan., Salina Airport.
81. Hebron, Ohio, Harbor Hills golf course.
82. Los Angeles, Calif., Air Mail Airport.
- *83. South Pekin, Ill.
84. Cincinnati, Ohio, Lunken Airport.
- *85. Healdton, Okla.
86. Akron, Ohio, Stow Field.
87. Akron, Ohio, Akron Airport.
88. Moline, Ill., Moline Airport.
89. Cleveland, Ohio, Glenn L. Martin Field.
90. Syracuse, N. Y., Syracuse Airport.
91. Dayton, Ohio, Johnson Flying Field.
92. Macon, Ga., Miller Field.
93. Philadelphia, Pa., Mustin Field.
- *94. Perry, Okla.
95. Schenectady, N. Y., Schenectady Airport.
96. Bristol, Pa., Keystone Landing Field.
97. Omaha, Neb., Fort Crook.
98. Cleveland, Ohio, Cleveland Airport.
99. Grand Rapids, Mich., Grand Rapids Airport.
100. Tulsa, Okla., McIntyre Airport.
101. Hartford, Conn., Brainard Field.
102. Memphis, Tenn., Armstrong Field.
103. Oklahoma City, Okla., Municipal Aviation Park.
104. Battle Creek, Mich., Battle Creek Airport.
105. St. Joseph, Mo., Ruscrans Municipal Air Field.
106. Corning, Calif., Woodson Airport.
107. Concord, N. H., Concord Airport.
108. Lexington, Ky., Lexington Airport.
109. New Dorp, N. Y., Miller Field.
110. Ypsilanti, Mich., Ypsilanti Airport.
111. Louisville, Ky., Bowman Field.
112. Wichita, Kan., Wichita Airport.
113. Georgia—Meteorological conditions.
114. Louisiana—Meteorological conditions.
115. Oklahoma—Meteorological conditions.
116. Ohio—Meteorological conditions.
117. Wyoming—Meteorological conditions.
118. Arkansas—Meteorological conditions.
119. Wisconsin—Meteorological conditions.
120. South Carolina—Meteorological conditions.
121. Symbols in Airway Bulletins.
122. Philadelphia, Pa., Pitscain Field.
123. San Antonio, Texas, Second Division Air Corps Field.
124. Washington, D. C., Hoover Field.
125. Pueblo, Colo., Pueblo Airport.
- *126. Dudley, Mass.
127. Birmingham, Ala., Roberts Field.
128. West Point, Va., Thompson Field.
129. Changes.
130. Inverness, Fla., Inverness Landing Field.
131. Wilmington, Del., Du Pont Field.
132. Detroit, Mich., Ford Airport.
133. New York—Meteorological conditions.
- 133a. New York—Meteorological conditions, upper-air winds.
134. North Carolina—Meteorological conditions.
135. Watertown, S. Dak., Watertown Airport.
136. Columbus, Ohio, Norton Field.
137. Miami, Fla., Fifty-fourth Street Aviation Field.
138. Indianapolis, Ind., Cox Field.
139. Martinsburg, W. Va., Shepherd Field.
140. Cheyenne, Wyo., Cheyenne Airport.
141. Sebring, Fla., Sebring Airport.
142. Boise, Idaho, Boise Airport.
143. Mansfield, La., Herndon Field.
144. Pine Bluff, Ark., Pine Bluff Airport.
145. Denver, Colo., Lowry Field.
146. Chicago, Ill., Chicago Municipal Airport.
147. Quonset Point, R. I., State Camp Grounds.
148. New Brunswick, N. J., Hadley Field.
149. Angeles, Texas, Angeles Landing Field.
150. Louisville, Ky., Louisville Airport.
151. New Jersey—Meteorological conditions.
152. Rhode Island—Meteorological conditions.
153. Mississippi—Meteorological conditions.
154. St. Louis-Chicago Airway.
155. Abilene, Texas, Kinsolving Field.
156. St. Paul, Minn., St. Paul Airport.
157. Jacksonville, Fla., Paxon Field.
158. Dallas-Oklahoma City Airway.
159. Oklahoma City-Wichita Airway.
160. Pueblo-Cheyenne Airway.
161. Minnesota—Meteorological conditions.
162. Little Falls, Minn., Little Falls Airport.
163. Wichita-Kansas City Airway.
164. Colorado Springs, Colo., Colorado Springs Airport.
165. Pasco, Wash., Pasco Airport.
166. Sioux Falls, S. Dak., Renner Field.
167. Denver, Colo., Denver Post Airdrome.
168. Austin, Tex., University Airport.
169. Walla Walla, Wash., Walla Walla Airport.
170. Washington—Meteorological conditions.
171. Dayton, Ohio, Moraine Field.
172. St. Louis, Mo., Lambert-St. Louis Field.
173. Los Angeles, Calif., Aero Corporation Field.
174. Kalamazoo, Mich., Kalamazoo Airport.
175. Middletown, Ohio, Middletown Airport Park.
176. Fishers Island, N. Y., Fort H. G. Wright.
177. Kokomo, Ind., Shockley Field.
178. Ponca City, Okla., Ponca City Airport.
179. Spokane, Wash., Felts Field.
180. Philadelphia, Pa., Philadelphia Airport.
181. Aberdeen, S. Dak., Aberdeen Airport.
182. Miles City, Mont., Miles City Airport.
183. Brazil, Ind., Brazil Airport.
184. Bridgeville, Pa., Mayer Field.
185. Fort Worth, Texas, Meacham Field.
186. Clearwater, Fla., Springtime Airport.
187. Butte, Mont., Butte National Airport.
188. Tacoma, Wash., Mueller-Harkins Airport.
189. Richmond, Va., Richmond Municipal Airport.
190. California—Meteorological conditions.
191. Lincoln, Neb., Lincoln Airport.
192. Salt Lake City, Utah, Woodward Field.
193. Cedar Rapids, Iowa, Cedar Rapids Airport.
194. Dell Rapids, S. Dak., Sioux Valley Airport.

195. Youngstown, Ohio, Lansdowne Field.
196. La Crosse, Wis., Salzer Field.
197. Oakland, Calif., Oakland Airport.
198. Sacramento, Calif., Mather Field.
199. Geneva, N. Y., Finger Lakes Airport.
200. Hamilton, Ohio, Ford Airport.
201. New Rochelle, N. Y., New Rochelle Airport.
202. Madison, Wis., Pennco Field.
203. Little Rock, Ark., Little Rock Airport.
204. Longview, Wash., Longview Airport.
205. Richmond, Va., Charles Field.
206. Burlington, Iowa, Burlington Airport.
207. Memphis, Tenn., New Brys Airport.
208. Winston-Salem, N. C., Municipal Airport.
209. Dallas, Tex., Love Field.
210. Baltimore, Md., Logan Field.
211. Cape May, N. J., Naval Air Station.
212. Seattle, Wash., Sand Point Field.
213. Nashville, Tenn., McConnell Field.
214. San Francisco, Calif., Mills Field.
215. Krum, Texas.
216. Laredo, Texas, Laredo Airdrome.
217. Fort Leavenworth, Kan., Ft. Leavenworth Field.
218. Slocum, R. I., Brown Farm Field.
219. Vancouver, Wash., Pearson Field.
220. Des Moines, Iowa, Des Moines Aviation Park.
221. Yreka, Calif., Yreka Airport.
222. Yakima, Wash., Goodman Field.
223. Los Angeles, Calif., Burdette Field.
224. Wrightstown, N. J., Camp Dix Field.
225. Los Angeles, Calif., Rogers Airport.
226. Laguna Beach, Calif., Skidmore Field.
227. Jamestown, R. I., Martin Field.
228. Santa Barbara, Calif., Ovington Airport.
229. Los Angeles, Calif., Shorts Airport.
230. Montana Meteorological Conditions.
231. San Mateo, Calif., Johnson Field.
232. Willoughby, Ohio, Willoughby Field.
233. New Brunswick, N. J., New Brunswick Airport.
234. Wisner, La., Gilbert Field.
235. Linton, N. D., Seeman Park.
236. Monticello, Ark., Monticello Airport.
237. Raleigh, N. D., Marshburn-Robbins Airport.
238. Claremont, N. H., Claremont Airport.
239. Camey, Kans., Truskett Airport.
240. Chanute, Kans., Chanute Airport.
241. Sacramento, Calif., Municipal Airport.
242. Spartanburg, S. C., Spartanburg Airport.
243. Shreveport, La., Steere Field.
244. Neenah, Wis., Neenah-Menasha Airport.
245. Liberal, Kans., Liberal Field.
246. Ayer, Mass., Camp Devens Field.
247. Milford, Ia., Donaldson Field.
248. Madison, Wis., Madison Airport.
249. Leadville, Colo., Bingham Field.
250. Stockton, Calif., Stockton Airport.
251. Niantic, Conn., State Camp Grounds.
252. Newton, Kans., Newton Airport.
253. Independence, Kans., Independence Airport.
254. Shelbyville, Ind., Nave Field.
255. Reno, Nev., Blanch Field.
256. Orlando, Fla., Buck Field.
257. Elko, Nev., Teddy Field.
258. Glens Falls, N. Y., Glens Falls Field.
259. Fort Lewis, Wash., 3rd Div. Airdrome.
260. Elmira, N. Y., Elmira Airport.
261. Anniston, Ala., Camp McClellan Field.
262. Worcester, Mass., Whittall Field.
263. Fargo, N. D., Hector Airport.
264. Houston, Texas, Houston Airport.
265. Medford, Ore., Barbara Field.
266. Pittsburgh, Pa., Bettis Field.
267. Richmond, Va., Richmond Air Junction.
268. Fort Huachuca, Ariz., Fort Huachuca Field.
269. Hempstead, N. Y., Mitchel Field.
270. Denver, Colo., Rocky Mountain Airport.
271. Paragould, Ark., Woody Field.
272. Lakeland, Fla., Haldeman-Elder Field.
273. Rockford, Ill., Blackhawk Airport.
274. Lansing, Ill., Ford Airport.
275. Columbus, Ga., Fort Benning Field.
276. Richmond, Ind., Berry Field.
277. Rock Springs, Wyo., Walter Stevens Field.
278. St. Petersburg, Fla., Piper-Fuller Field.
279. Denver, Colo., Alexander Airport.
280. Minneapolis, Minn., Wold-Chamberlin Field.
290. Seal Beach, Calif., Crawford Airport.
281. Muncie, Ind., Muncie Airport.
282. Visalia, Calif., Visalia Airport.
283. Eldorado, Kan., Eldorado Airport.
284. Tallahassee, Fla., Tallahassee Airport.
285. Parsons, Kan., Ryan Airport.
286. Augusta, Mich., Camp Custer Field.
287. Quartzsite, Ariz., Conner Field.
288. Lansing, Mich., Capital City Airport.
289. Northville, Mich., Stinson Northville Field.
290. Seal Beach, Calif., Crawford Airport.
291. Bismarck, N. D., Bismarck Field.
292. Grayling, Mich., Grayling Field.
293. Atlanta, Ga., Candler Field.
294. Grant's Pass, Ore., Grant's Pass Airport.
295. Muskegon, Mich., Continental Airport.
296. San Diego, Calif., Mahony Field.
297. San Diego, Calif., Naval Air Station.
298. Martins Ferry, Ohio, Scott Field.
299. Wallingford, Conn., Wallingford Airport.
300. Lawton, Okla., Fort Sill Field.

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3841 Navy Building, Washington, D. C.

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For the fiscal year 1927 the Committee had available \$513,000, of which amount \$504,916 was expended.

The office of Aeronautical Intelligence during the year distributed 55,636 technical reports and documents, the heaviest distribution by classes being to aircraft manufacturers and to educational institutions. This was an increase of 19,800 documents distributed on miscellaneous requests alone and represented an overall increase of 55% over the preceding year.

Technical investigations undertaken by the Committee included the following:

For the Air Corps of the Army

Investigation of the flat spin of the Douglas O-2 airplane.
Full-scale investigation of different wings on the Sperry messenger airplane.
Investigation of the behavior of an airplane in landing and in taking off.
Investigation of pressure distribution and accelerations in pursuit type airplane.
Acceleration readings on the PW-9 airplane.

For the Bureau of Aeronautics of the Navy Department

Investigation of pressure distribution on vertical tail surfaces fitted with balanced rudders.
Investigation of methods of improving wing characteristics by control of the boundary layer.
Development of a solid-injection type of aeronautical engine.
Investigation of method of improvement in range of vision of pilot in an airplane.
Investigation of maximum tail loads in dives.
Investigation of the effect of fineness ratio on airship models.
Design of accelerometers for determination of accelerations in catapulting.
Investigation of the forces on seaplane floats under landing conditions.
Investigation of water pressure distribution on seaplane hulls.
Study of design factors for metal propellers.
Investigation of application of compression ignition operation to air-cooled engine cylinders.
Investigation of flight path characteristics.
Effect of varying the aspect ratio and area of wings on performance of fighter airplane with supercharged air-cooled engine.
Investigation of aerodynamic loads on the U. S. S. *Los Angeles*.
Investigation of autorotation.
Investigation of spoiler aileron control.
Development of aircraft engine supercharged.
Investigation of performance of five propellers in flight.
Effect of various forms of cowling on performance and engine operation of fighter airplane with supercharged air-cooled engine.

List of Technical Reports Issued During 1927

(For Previous Lists See *Aircraft Year Books*, 1925, 1926 and 1927)

- No. 257. Pressure Distribution Over a Wing and Tail Rib of a VE-7 and of a TS Airplane in Flight. By J. W. Crowley, Jr.
258. Some Factors Affecting the Reproducibility of Penetration and the Cut-Off of Oil Sprays for Fuel Injection Engines. By E. G. Beardsley.
259. Characteristics of Propeller Sections Tested in the Variable-Density Wind Tunnel. By Eastman N. Jacobs.
260. The Effect of a Flap and Ailerons on the N. A. C. A. M6 Airfoil Section. By George J. Higgins and Eastman N. Jacobs.
261. Resistance and Cooling Power of Various Radiators. By R. H. Smith.
262. Friction of Aviation Engines. By S. W. Sparrow and M. A. Thorne.
263. Preliminary Flight Tests of the N. A. C. A. Roots Type Aircraft Engine Supercharger. By Arthur W. Gardiner and Elliott G. Reid.
264. Differential Pressures on a Pitot-Venturi and a Pitot-Static Nozzle over 360° Pitch and Yaw. By R. M. Bear.
265. A Full-Scale Investigation of Ground Effect. By Elliott G. Reid.
266. Air Force and Moment for N-20 Wing with Certain Cut-Outs. By R. H. Smith.
267. Drag of Wings with End Plates. By Paul E. Hemke.
268. Factors in the Design of Centrifugal Type Injection Valves for Oil Engines. By W. F. Joachim and E. G. Beardsley.
269. Air Force Tests of Sperry Messenger Model with Six Sets of Wings. By James M. Shoemaker.
270. The Measurement of Pressure Through Tubes in Pressure Distribution Tests. By Paul E. Hemke.
271. Pressure Distribution Tests on PW-9 Wing Models Showing Effects of Biplane Interference. By A. J. Fairbanks.
272. The Relative Performance Obtained with Several Methods of Control of an Over-compressed Engine Using Gasoline. By Arthur W. Gardiner and William E. Whedon.
273. Wind Tunnel Tests on Autorotation and the "Flat Spin." By Montgomery Knight.
274. The N. A. C. A. Photographic Apparatus for Studying Fuel Sprays from Oil Engine Injection Valves, and Test Results from Several Researches. By Edward G. Beardsley.
275. The Effect of the Walls in Closed Type Wind Tunnels. By George J. Higgins.
276. Combustion Time in the Engine Cylinder and Its Effect on Engine Performance. By Charles F. Marvin, Jr.
277. The Comparative Performance of an Aviation Engine at Normal and High Inlet Air Temperatures. By Arthur W. Gardiner and Oscar W. Schey.
278. Lift, Drag, and Elevator Hinge Moments of Handley-Page Control Surfaces. By R. H. Smith.
279. Tests on Models of Three British Airplanes in the Variable-Density Wind Tunnel. By George J. Higgins, W. S. Diehl, and George L. DeFoe.
280. The Gaseous Explosive Reaction—The Effect of Inert Gases. By F. W. Stevens.
281. The Effects of Fuel and Cylinder Gas Densities on the Characteristics of Fuel Sprays for Oil Engines. By W. F. Joachim and Edward G. Beardsley.
282. The Performance of Several Combustion Chambers Designed for Aircraft Oil Engines. By W. F. Joachim and Carlton Kemper.

List of Technical Notes Issued During 1927

- No. 248. The Drag of Airships. By Clinton H. Havill, United States Navy. Part II. Drag of Bare Hulls.
249. Effect of Protruding Gasoline Tanks Upon the Characteristics of an Airfoil. By Eastman N. Jacobs.
250. Influence of the Orifice on Measured Pressures. By Paul E. Hemke.
251. The Effect of Tube Length Upon the Recorded Pressures from a Pair of Static Orifices in a Wing Panel. By T. Carroll and R. E. Mison.
252. Resistance of a Fifteen-Centimeter Disk. By James M. Shoemaker.
253. Wind Tunnel Standardization Disk Drag. By Montgomery Knight.
254. Method of Correcting Wind Tunnel Data for Omitted Parts of Airplane Models. By R. H. Smith.
255. Precision of Wing Sections and Consequent Aerodynamic Effects. By Frank Rizzo.
256. Wall Interference in Closed Type Wind Tunnels. By George J. Higgins.
257. Technical Preparation of the Airplane "Spirit of St. Louis." By Donald A. Hall.
258. A Warning—Concerning the Take-Off with Heavy Load. By Elliott G. Reid and Thomas Carroll.
259. "Alclad"—A New Corrosion-Resistant Aluminum Product. By E. H. Dix, Jr.
260. Study of Open Jet Wind Tunnel Cones. By Fred E. Weick.
261. Tension Experiments on Diaphragm Metals. By H. B. Henrickson.
262. The Installation and Correction of Compasses in Airplanes. By M. F. Schoeffel.
263. A Load Factor Formula. By Roy G. Miller.
264. Tests of the N. P. L. Airship Models in the Variable-Density Wind Tunnel. By George J. Higgins.
265. Measurement of the Moments of Inertia of Full-Scale Airplanes. By M. W. Green.
266. Airfoil Lift with Changing Angle of Attack. By Elliott G. Reid.

List of Technical Memorandums Issued During 1927

- No.
382. Experiments with Rotating Cylinders in Combination with Airfoils. By Kurt Frey. Translation from "Zeitschrift für Flugtechnik und Motorluftschiffahrt," August 28, 1926.
 383. Spindled and Hollow Spars. By J. D. Blyth. From "Flight," August 26, 1926.
 384. Experimental Investigation of the Physical Properties of Medium and Heavy Oils, Their Vaporization and Use in Explosion Engines. By Fritz Heinlein. Part III. Experimental Apparatus. Translation from "Der Motorwagen," June 30, 1926.
 385. Cooling of Air-Cooled Engines by Forced Circulation of Air. Translation from "Les Ailes," September 9, 1926.
 386. Central Aerohydrodynamic Institute of Moscow, Russia. By W. Margoulis. Translation from "L'Aeronautique," August, 1926.
 387. Approximate Calculation of the Static Longitudinal Stability of Airplanes. By Theodor Bielen. Translation from "Zeitschrift für Flugtechnik und Motorluftschiffahrt," July 28, 1926.
 388. Experiments with a Sphere from Which the Boundary Layer Is Removed by Suction. By Oskar Schrenk. Translation from "Zeitschrift für Flugtechnik und Motorluftschiffahrt," September 14, 1926.
 389. Devices for Prevention of Stalled Flight. By Paul Mazer. Translation from "L'Aeronautique," October, 1926.
 390. Determining Size of Drops in Fuel Mixture of Internal-Combustion Engines. By J. Sauter. Translation from "Zeitschrift des Vereines deutscher Ingenieure," July 31, 1926.
 391. Experiments on Self-Ignition of Liquid Fuels. By Kurt Neumann. Translation from "Zeitschrift des Vereines deutscher Ingenieure," August 7, 1926.
 392. Experimental Investigation of the Physical Properties of Medium and Heavy Oils, Their Vaporization and Use in Explosion Engines. By Fritz Heinlein. Part IV. Translation from "Der Motorwagen," September 30 and November 10, 1926.
 393. Stall-Proof Airplanes. By G. Lachmann. From Year Book of "Wissenschaftlichen Gesellschaft für Luftfahrt," 1925.
 394. Testing a Windmill Airplane ("Autogiro"). By R. Seiferth. Translation from "Zeitschrift für Flugtechnik und Motorluftschiffahrt," November 27, 1926.
 395. Removing Boundary Layer by Suction. By J. Ackeret. Translation from "Zeitschrift des Vereines deutscher Ingenieure," August 28, 1926.
 396. Determining the Efficiency of Atomization by Its Fineness and Uniformity. By J. Sauter. Translation from "Forschungsarbeiten auf dem Gebiete des Ingenieurwesens," No. 279, 1926.
 397. High-Speed Oil Engines for Vehicles. By Ludwig Hausfelder. Part I. Engines with External Atomization of the Fuel; Engines with Internal Atomization of the Fuel; Hot-Bulb Engines; Diesel Engines. Translation from "Der Motorwagen," August 31, 1926.
 398. Researches on Ailerons and Especially on the Test Loads to Which They Should be Subjected. By J. Sabatier. Translation from "La Technique Aeronautique," November 15 and December 15, 1926.
 399. Duralumin Welding. By Wm. Nelson. From "Aviation," January 17, 1927.
 400. On the Mutual Reaction of Wings and Body. By J. Lennertz. Translation from "Zeitschrift für Flugtechnik und Motorluftschiffahrt," January 4, 1927.
 401. The Heat Treatment of Duralumin. By Wm. Nelson, from "Aviation," February 21, 1927.
 402. Permanent Commission of Aeronautical Studies. Report No. 4.
 Part I. Determination of the Main Conditions Entailing Overload and Examination of the Existing Theoretical and Experimental Data.
 Part II. Reduction of the General Conditions of Calculation to Some Simple Cases.
 Part III. Load Factors.
 Translation from the French.
 403. High-Speed Oil Engines for Vehicles. By Ludwig Hausfelder. Part II. Translation from "Der Motorwagen," September 30 and December 10, 1926.
 404. The Protection of Duralumin from Corrosion. By Wm. Nelson. From "Aviation," November 8, 1926.
 405. Structural Details from 1926 Paris Aero Salon. By W. Rethel. Translation from "Zeitschrift für Flugtechnik und Motorluftschiffahrt," February 14, 1927.
 406. Flap Gear for Airplanes. A New Scheme in Which Variation Is Automatic. By A. Hessel Tiltman. From "The Automobile Engineer," February, 1927.
 407. Some Impressions of the Paris Aero Show. By J. D. North. From "The Aircraft Engineer," supplement to "Flight," December 30, 1926.
 408. Duralumin and Its Corrosion. By Wm. Nelson. From "Aviation," November 1, 1926.
 409. Kinetographic Determination of Airplane Flight Characteristics. By P. Raethjen and H. Knott. Translation from "Zeitschrift für Flugtechnik und Motorluftschiffahrt," December 14 and 28, 1926.
 410. High-Speed Oil Engines for Vehicles. By Ludwig Hausfelder. Part III. Translation from "Der Motorwagen," December 20 and 31, 1926, and January 10, 1927.
 411. Determining the Velocity Distribution in the Boundary Layer of an Airfoil Fitted with a Rotary Cylinder. By B. G. Van der Hegge Zijnen. Translation from Report A129 of the "Rijks-Studiedienst voor de Luchtvaart," Amsterdam. Reprint from "De Ingenieur," October 23, 1926, No. 43.

412. Air Cooling. An Experimental Method of Evaluating the Cooling Effect of Air Streams on Air-Cooled Cylinders. By J. F. Alcock. From "The Automobile Engineer," April, 1927.
413. Multiplicity of Solutions in Aerodynamics. By M. Dupont. Translation from "La Technique Aeronautique," December, 1926, and January, 1927.
414. Aerodynamic Laboratory at Cuatro Vientos. By Moreno Caracciolo. Translation from "Boletin Oficial," Royal Aero-Club of Spain, 2d quarter, April-June, 1924, and "L'Aeronautique," September, 1926.
415. Climbing Efficiency of Aircraft. By C. C. Walker. From "Flight," January 27, 1927.
416. Effect of Streamline Curvature on Lift of Biplanes. By L. Prandtl. Translation from Report III, "Ergebnisse der Aerodynamischen Versuchsanstalt zu Göttingen," 1927.
417. Drag Measurements of Two Thin Wing Sections at Different Index Values. By J. Ackeret. Translation from Report III, "Ergebnisse der Aerodynamischen Versuchsanstalt zu Göttingen," 1927.
418. Investigation of a Wing with an Auxiliary Upper Part. By R. Seifert. Translation from Report III, "Ergebnisse der Aerodynamischen Versuchsanstalt zu Göttingen," 1927.
419. Experiments with Three Horizontal Empennages. By R. Seifert. Translation from Report III, "Ergebnisse der Aerodynamischen Versuchsanstalt zu Göttingen," 1927.
420. Some Notes on Gasoline-Engine Development. (A Résumé of a Paper by H. R. Ricardo.) From "The Automobile Engineer," April, 1927.
421. Aero Dopes and Varnishes. By H. T. Britton. From "The Industrial Chemist," March, 1927.
422. Systematic Investigation of Joukowski Wing Sections. By O. Schrenk. Translation from "Zeitschrift für Flugtechnik und Motorluftschiffahrt," May 28, 1927.
423. Lindbergh's Flight. By August von Parseval. Translation from "Der Motorwagen," May 31, 1927.
424. Discussion of the Results of the Boundary-Layer Tests of an Airfoil Fitted with a Rotary Cylinder. By E. B. Wolff and C. Koning. Translation of Report A130 of the "Rijks-Studiedienst voor de Luchtvaart," Amsterdam. Reprint from "De Ingenieur," No. 52, December 25, 1926.
425. Recent Suggestions in Diesel-Engine Construction. By F. Ernst Bielefeld. Translation from "Schiffbau," June 2, June 16, and July 7, 1926.
426. Seaplane Floats and Hulls. By H. Herrmann. Translation from "Berichte und Abhandlungen der Wissenschaftlichen Gesellschaft für Luftfahrt," December, 1926.
427. Seaplane Floats and Hulls. By H. Herrmann. Part II. Translation from "Berichte und Abhandlungen der Wissenschaftlichen Gesellschaft für Luftfahrt," December, 1926.
428. Drag Measurements on a Junkers Wing Section. Application of the Betz Method to the Results of Comparative Tests Made on a Model and on an Airplane in Flight. By Hanns Weidinger. Translation from "Berichte und Abhandlungen der Wissenschaftlichen Gesellschaft für Luftfahrt," December, 1926.
429. Building a Full-Size Glider. By F. J. Camm. From "The Air League Bulletin," of the Air League of the British Empire, London, No. 68, June, 1927.
430. Effect of Roughness on Properties of Airfoils. By O. Schrenk. Translation from Report III, "Ergebnisse der Aerodynamischen Versuchsanstalt zu Göttingen," 1927.
431. Experiments on Airfoils with Trailing Edge Cut Away. By J. Ackeret. Translation from Report III, "Ergebnisse der Aerodynamischen Versuchsanstalt zu Göttingen," 1927.

List of Aircraft Circulars Issued During 1927

- No. 17. The Avro Avian Airplane. From "Flight," August 26, 1926.
18. The De Havilland Moth. From "Flight," March 5, 1925.
19. The Bristol Badminton Airplane. From "Flight," July 8, 1926.
20. The Handley-Page *Hamlet* (Commercial Monoplane). From "The Aeroplane," October 13, 1926, and "Flight," October 14, 1926.
21. The A. N. E. C. IV *Missel Thrush*, Light Airplane. From "Flight," September 9, 1926.
22. Avia Pursuit Airplane *B. H. 21*. By J. Serryer. Translation from "Les Ailes," May 28, 1925.
23. Albert *TE-1*, Training Airplane. Translation from the French.
24. Rohrbach All-Metal Commercial Airplane *RO VIII*, "Roland." Translation from the German.
25. The Supermarine *Southampton*, Seaplane (Observation or Bomber). From "Flight," November 18 and 25, 1926.
26. The Boulton and Paul *Bugle*, Airplane (Day Bomber). From "Flight," April 23, 1925, and "The Aeroplane," April 29, 1925.
27. Dyle and Bacalan Metal Monoplane *D. B. 10* (Night Bomber). Translation from "Les Ailes," December 2, 1926, and "L'Aerophile," November, 1926.
28. Combat and Bombing Airplane, *Amiot 120 B3*. Translation from a circular issued by the S. E. C. M. ("Société d'Etudes et de Constructions Mécaniques").
29. Nieuport-Delage 48 *C1*, Pursuit Airplane ("Jockey" Type). Translation from the French.
30. The Dornier *Mercury*, Commercial Airplane. From a circular issued by the Dornier Co.

31. Dornier *Superwal*, Commercial Seaplane. From "I. F. W." No. 31, 1926, and from a circular issued by the Dornier Co.
32. Macchi M. 39, Seaplane (Single Seat Racer). Translation from "L'Ala d'Italia," November, 1926.
33. "Savoia" Seaplane S. 55 (Military or Commercial). From a circular issued by the "S. I. A. I." and "Flight," April 9, 1925.
34. Vojenska-Smolik S. 16, Airplane (All-Metal Long-Distance Observation Biplane). From "Flight," January 13, 1927.
35. Richard-Penhoet Commercial Seaplane. Translation from "Bulletin de la Chambre Syndicale des Industriels Aeronautiques," September-December, 1926.
36. The Rohrbach "Robbe" RO VII, Seaplane (Military or Commercial). From a circular issued by the Rohrbach Metal Aeroplane Co.
37. The Francois Villiers Marine Pursuit Airplane. From a circular issued by Villiers Co., supplemented from article in "Les Ailes," November 25, 1926.
38. Heinkel H. E. 5, Commercial Seaplane (Winner of the 1926 German Seaplane Contest at Warnemunde). From a circular issued by the Ernst Heinkel Airplane Co.
39. Lioré-Olivier LeO 194, Seaplane. Translation from "L'Aéronautique," February, 1927.
40. Training Airplane Avia B. H. 11. Translation from a circular issued by Milos Bondy A Spol, Czechoslovakia.
41. *Meteora* 63, Commercial Seaplane. From a circular issued by the S. P. C. A. with supplementary data from "Les Ailes," July 29, 1926.
42. The Mureaux Brunet 3C3, Pursuit Airplane. By J. Serryer. Translation from "Les Ailes," March 24, 1927.
43. Fiat C. R. 20, Pursuit Airplane. Translation from "L'Ala d'Italia," December, 1926.
44. The Rohrbach *Rocco*, Seaplane (New German Commercial Seaplane). From "Flight," May 12, 1927.
45. The Blackburn *Bluebird* (Two-Seat Training and Sport Airplane). From "The Aeroplane," March 16, 1927.
46. Focke-Wulf G. L. 18 (Commercial Airplane). By J. Serryer. Translation from "Les Ailes," September 23, 1926.
47. Junkers Airplane G. 24 (All-Metal Commercial Airplane). Translation from a circular issued by the "Junkers Flugzeugwerk, A. G.," of Dessau, Germany.
48. The Gloster *Gambet*, Airplane (A Deck-Landing Ship's Fighter). From "The Aeroplane," June 1, 1927.
49. The Avro "Gosport" 504 R (A New Training Airplane). From "Flight," April 15, 1926.
50. *Levasseur* 8, Transatlantic Airplane. Translation from "L'Aéronautique," June, 1927, and "L'Aerophile," June, 1927.
51. Caproni Airplane Ca 73 (Commercial) and Ca 73 ter (Military). Translation from a circular issued by the Caproni Co., Milan, Italy.
52. The Boeing Mail Airplane. Prepared by the Boeing Airplane Co.
53. The Westland *Widgeon* III. From "Flight," July 28, 1927.
54. Junkers Commercial Airplane G. 31. Translation from "Zeitschrift des Vereines deutscher Ingenieure," May 7, 1927.
55. *Travel Air*, Commercial Airplane—Type 5000. Prepared by Travel Air Manufacturing Co.
56. Training Airplane *Arado* SC 1. Translation from "Flugwoche," June 22, 1927.

Bibliographies of Aeronautics

During the past year the Committee issued Bibliographies of Aeronautics for the years 1923 and 1924. Subsequent bibliographies are in course of publication.

AERONAUTICAL ENGINEERING COURSES

The following is a detailed list of courses in aeronautical engineering offered by leading universities and technical institutions in the United States.

Massachusetts Institute of Technology

Subject No. 16.01—Airplane Design. General theory of the design of airplanes, including calculations of stresses and performance and the study of stability and control.

Subject No. 16.015—Airplane Design. Part of 16.01.

Subject No. 16.04—Advanced Airplane Design. Special topics in stability and control and performance calculation, and advanced points in layout of airplanes for specific purposes are considered.

Subject No. 16.06—Advanced Airplane Structures. Examination of new methods in structural analysis and original work on analyses of greater refinement than those ordinarily made. Particular attention is paid to the applications of the generalized three-moment equation and the method of least work.

Subject No. 16.11—Airplane Design Practice. Identical with 16.13, but 16.11 and 16.12 are given in two terms.

Subject No. 16.115—Aeronautics. Continuation of 16.785, completing 16.78 and 16.11.

Subject No. 16.12—Airplane Design Practice. Identical with 16.13, but 16.11 and 16.12 are given in two terms.

Subject No. 16.13—Airplane Design Practice. Actual practice in design. Each student carries through the design of a training airplane.

Subject No. 16.14—Airplane Design Practice. A continuation of 16.13 with a more complete study of detail design and with more opportunity for the display of initiative by the student.

Subject No. 16.21—Airship Theory. A study of the theory of aerostatics and aerodynamics as applied to lighter-than-air craft, including discussion of the properties of aerostatic gases and of the stability and control of airships. (Not given in 1927-28.)

Subject No. 16.22—Non-Rigid Airship Design. Theory and practice of the design and construction of non-rigid airships, including stress calculations for envelope, suspension and car. (Not given in 1927-28.)

Subject No. 16.24—Non-Rigid Airship Design Practice. Actual practice in design, including stress calculations. Each student carries through the design of a non-rigid airship. (Not given in 1927-28.)

Subject No. 16.26—Rigid Airship Design. Theory and practice of design of rigid and semi-rigid airships, including stress calculations for the hull. (Not given in 1927-28.)

Subject No. 16.28—Rigid Airship Design Practice. Drafting room practice in the layout of a rigid or semi-rigid airship. (Not given in 1927-28.)

Subject No. 16.30—Aerial Propellers. Theory and practice of propeller design by several methods, including the study of propeller stresses.

Subject No. 16.32—Aerial Propeller Design Practice. Drafting room practice in the calculation and design of a propeller for specific aircraft.

Subject No. 16.35—Aircraft Instruments. Discussion of the use of instruments in the navigation of aircraft, with analysis of the theoretical and practical problems entering into their design.

Subject No. 16.41—History of Aeronautics. History of the airplane and airship, with special reference to the technical development.

Subject No. 16.42—Aerial Transport. A discussion of the technical, economic, and legal problems attending the operation of air lines for the carriage of passengers, express, and mail.

Subject No. 16.48—Aircraft Armament. A general discussion of the types of machine gun, aircraft cannon and bomb releasing gears used on airplanes, together with a general treatment of the theory of sighting and operation of aircraft armament, and in particular of the special equipment necessitated by the difference between the conditions of aerial and ground operation. Open only to officers of U. S. Army, Navy, and Marine Corps.

Subject No. 16.51—Rigging and Maintenance of Aircraft. Devoted to actual work on the assembly, disassembly, alignment, and adjustment and minor repair of airplanes. Methods of maintenance work will be studied and maintenance operations actually practiced on one or more airplanes of conventional type.

Subject No. 16.54—Airplane Construction. Lectures discussing the methods used in constructing airplanes, either experimentally or in large production, the tools and other equipment needed, and the estimation of costs.

Subject No. 16.62—Aeronautical Laboratory. An abbreviation of 16.65 and 16.67. Includes both lectures on the methods and equipment used in aeronautical research and experience in the making of tests in the Institute wind tunnels.

Subject No. 16.65—Aeronautical Research Methods. Lectures on aeronautical laboratories and their equipment and on methods of free-flight testing.

Subject No. 16.67—Aeronautical Laboratory. Training in the use of wind tunnels, especially as applied to problems of airplane and airship design.

Subject No. 16.68—Conduct of Aeronautical Research. A continuation of 16.65. Devoted chiefly to the design of equipment, the discussion of general research methods, and the planning of the methods of attack on specific new problems.

Subject No. 16.69—Aeronautical Seminar. Intended primarily for students conducting thesis in aeronautics. Consists of a series of meetings with discussions of current research work by graduate students and members of the wind tunnel staff.

Subject No. 16.72—Propellers and Airships. A brief discussion of the theories of design of aerial propellers and their application and of the design and construction of various types of lighter-than-air craft. Intended primarily to give students who are prospective airplane specialists a broadened knowledge of the aeronautical field as a whole.

Subject No. 16.76—Aeronautics. Airplane design and the general principles of flight.

Subject No. 16.78—Aeronautics. A comprehensive course containing material on airship design, aerial propeller design and theory, and aeronautical laboratory methods. Intended to be supplementary to 16.76.

Subject No. 16.785—Aeronautics. Continuation of 16.015, completing 16.01, and part of 16.78.

Subject No. 16.82—Aero Engines. The design and construction of modern aeronautical engines is taken up from the point of view of the airplane designer and operator.

Subject No. 16.83—Airplane Engine Design. Covers the thermodynamics, mechanics, materials, and methods of construction from the point of view of the designer, followed by a study of the methods of designing the various mechanical parts of the engine, in accordance with the requirements of modern aeronautical practice.

Subject No. 16.84—Airplane Engine Design. Includes a study of carburetion, induction, ignition, lubrication, cooling, supercharging, accessories and the potentialities of new forms of power plants.

Subject No. 16.85—Airplane Engine Design Practice. This is made up of a number of drafting room exercises covering certain fundamental problems in aircraft engine design.

Subject No. 16.86—Airplane Engine Design Practice. In this course the student chooses, under certain necessary limitations, definite type and size of aircraft engine which he uses as the basis for a complete design. As far as possible, the design methods used are representative of modern practice in the aircraft engine industry.

Subject No. 16.90—Aero Engine Laboratory. Study of aeronautical engines, laboratory test equipment, and tests procedure. Performance tests run on aero engines using different type dynamometers and test equipment.

Subject No. M43—Theoretical Aeronautics.

Subject No. M44—Theoretical Aeronautics. These two courses M43 and M44 open to third and fourth year students. The main topics covered are (a) The mechanics of the airplane, including vibrations, moment of momentum, moving axes, etc. (b) The mechanics of irrotational fluid motion and its application to lift the drag. (c) The stability of the airplane.

Subject No. M46—Advanced Wing Theory.

Subject No. M47—Advanced Wing Theory. M46 and M47—selected advanced topics in continuation of M44.

Purdue University

Course 193. Aeronautical Engineering.—Sem. 1. Must be preceded or accompanied by Applied Mechanics 1 and 2.

Rotary and stationary aviation engines; advantages and principles of operation of each kind; theoretical and practical problems.

Course 194. Aeronautical Engineering.—Sem. 2. Must be preceded or accompanied by Applied Mechanics 1 and 2.

Meteorology; principles of mechanical and buoyant flight, and the application of engineering to its various problems; with special attention given to a discussion of the performances and possibilities of approved and proposed types of aircraft and the commercial and military future of aviation.

Course 195. Aviation Engine Design.—Sem. 1. Must be preceded by Applied Mechanics 1 and 2. Mechanical Engineering 61 and 62 and accompanied by 193.

The chief characteristics of aviation engines and their requirements for different services are discussed. The elements common to all types are worked out in a group, after which each student completes the calculations and details for a motor to meet certain requirements.

Course 196. Aircraft Design.—Sem. 2. Must be preceded by Applied Mechanics 1 and 2, Mechanical Engineering 61 and 62, and preceded or accompanied by 193 or 194.

The various elements of construction and design of air craft are considered. Suitable materials are selected and the main parts calculated for strength and airfoil. Each student takes up a special type, works out the details and prepares complete drawings.

Course 293. Advanced Aeroplane Design and Sem. 1. Aeroplane Structures, this is a continuation of Course 194 with more advanced study of stability, control and performance. The layout of aeroplanes for a definite purpose is considered. A more complete analysis of the aeroplane structure is made by the latest methods. Must be preceded by Course 196.

Theory and Design of the Sem. 2. Aerial Propeller. Theory and design of the aerial propeller by several methods including the modified Drzewiecki System and Eiffel's Method. The student designs a propeller for a certain definite purpose, analyzes the stresses in the blades and makes the drawing. Must be preceded by Course 194.

Courses 193 and 195 consist of two hours recitations per week each for one semester of 17 weeks.

Courses 194 and 196 consist of 6 hours per week each in design and drafting for one semester of 17 weeks.

Courses 293 and 294 consist of one hour lecture, one hour recitation and 3 hours design and drafting each for one semester of 17 weeks.

University of Michigan

1. General Aeronautics. Lectures and recitations. An introductory course giving the essential principles of aeronautics (balloons, dirigibles, ornithopters, helicopters, aeroplanes, helicopters and kites), history of flight and description of modern aircraft. Open to all students. Two hours credit. First semester.

2. Theory of Aviation. Lectures and recitations. The course deals with the following general discussion of modern aerodynamical theories of lift and drag; the results of wind tunnel and flight experiments, and the performance of airplanes, including stability and balance studies. Prerequisite: Courses E.M. 1 and E.M. 3. Two hours credit. Second semester.

3. Theory and Design of Propellers. Lectures, recitations, and drawing. Theory of propellers and analysis of propeller performance on the Drzewiecki system; Eiffel's method of propeller analysis and graphical method of determining propellers for specified conditions; analytical and graphical methods of investigating the strength of propellers and influence of gyrostatic moments in quick turns. The student will design a propeller and analyze the distribution of stresses in the blades. Must be preceded or accompanied by Course 2. Three hours credit. First semester.

4. Aeroplane Design. Lectures and recitations. This course includes the investigation of the design of the aeroplane from the aeronautical and strength standpoints. The strength and design of all the details are discussed and a completed design prepared. Must be preceded or accompanied by Course 3, and preceded by M.E. 6 and C.E. 2. Two hours credit. First semester.

4a. Aeroplane Design. Continuation of preceding course. Drawing only. Two hours credit. Second semester.

5. Aerodynamic Laboratory. An elementary course covering use of instruments. Investigation of aerodynamical properties of the various combination of bodies and aero-

foils used in aeroplanes and airships, test of propellers. Must be preceded or accompanied by Courses 2 and 3, and preceded by M.E. 7. One hour credit. Second semester.

6. Design of Aeronautical Motors. Lectures and drawing. Complementary course to M.E. 15 or M.E. 30, dealing with special features of the aeronautical motors, a more refined method of cam design, analysis of vibration and balancing of motors, critical study of various types of motors, and complete general plans of a motor of a certain type are prepared. Prerequisite: M.E. 15 or M.E. 30. Two hours credit. Second semester.

7. 8. Lighter-than-Air Craft. Lectures and recitations. This course is concerned with the following: aerostatics, and major aerodynamic and structural design problems of non-rigid, semi-rigid and rigid aircraft. Two hours credit. Second semester.

10. Design of Aerodromes and Hangars. Lectures, recitations, and drawing. Planning and equipment of aerodromes and aero-ports; study of construction of transportable and stationary hangars. General plans of an airdrome are prepared. Prerequisite: Courses 2 and 7. Two hours credit.

11. Advanced Stability. Lectures and recitations. Advanced study of more complicated phenomena of stability, according to Bryan with Birstow's applications of experimentally determined resistance, derivatives and rotary co-efficients. Prerequisite: Course 2 and Math. 4b (Differential Equations). Two hours credit. First semester.

12. Seminary. Reading and reports on selected aerodynamical and aeronautical problems. Open only to graduates and seniors who receive special permission. A reading knowledge of French and German is most desirable. Credit to be arranged.

13. Advanced Design. Continuation of Course 4a, taking up some of the more complex or special problems. Open primarily to graduates. Credit to be arranged.

14. Research. Continuation of Course 5, offering an opportunity for students to pursue advanced experimental and analytical investigations of any problems in connection with aeronautics. The work of the course consists of investigations for securing data on the more difficult problems of aeronautics and mathematical interpretation of the results. Must be preceded by Math. 57 and 58. Open primarily to graduates. A reading knowledge of French and German is desirable. Credit to be arranged.

15. Mathematical Theory of Aerofoils. Lectures and recitations. Advanced study of the Joukovsky, von Mises and Witosznski theory of wing profiles and the Prandtl theory of the Induced Drag, preceded by a brief review of the fundamentals of the Mathematical Theory of Hydrodynamics. Prerequisite: Course 2, Math. 4b (Differential Equations) and Math. 201 (Theory of Functions of a Complex Variable). Two hours credit. Second semester.

16. Air Transportation. Engineering and economic aspects. Two hours credit. Each semester.

University of Nebraska

M.E. 121—Internal Combustion Engines—The theory of and the thermodynamic application to the design of gas, gasoline, kerosene and heavy oil engines and of the automotive, aeronautic and marine engines: Otto and Diesel cycles; types and their operating characteristics; carburetion and combustion. Prerequisite: Course 113. Credit 3 hours. First semester.

M.E. 150—Aeroautical Engineering—This course is designed to give the student the fundamentals of aeronautical engineering; the theory and dynamics of flight; general principles of design; types of aircraft and their operating characteristics; instruments and auxiliary equipment. Prerequisite: Course 121. Credit 3 hours. Second semester.

M.E. 152—Aeronautic Engine and Equipment Testing—Investigation of the performance of aviation engines, propellers and their auxiliary equipment; aeronautical instruments; effects on performance due to change in altitude; determining the center of gravity of airplanes for different loading conditions. Prerequisite: Course 121, 127 and parallel with Course 150. Laboratory 6 hours, credit 2 hours. Second semester.

M.C. 199—Research and Thesis—For seniors, on approval. Credit 3 to 5 hours.

A.M. 108C—Aeronautical Engine Design—The student is given an assumed working condition and specification as to speed and power for which he is required to design the various parts, make complete details and an assemblage drawing and also estimate the cost of construction of an aviation engine. Prerequisite: Courses A.M. 106, A.M. 114 and M.E. 121. Three hours credit. Second semester.

132. Heat Treatment of Metals—This course, based upon a working knowledge of metallography, is intended to give the student the theory of and the present-day practice in the heat treatment of metals and alloys used in the aeronautical, automotive and allied industries. Prerequisite: Course 130. Lecture one hour, laboratory 4 hours, credit 2 hours. Second semester.

AIR MAIL SERVICE

POST OFFICE DEPARTMENT

Washington, D. C.

Postmaster General	Hon. Harry S. New.
Second Assistant Postmaster General	Hon. W. Irving Glover.
Deputy Second Assistant Postmaster General	Hon. Chase C. Gove.
Superintendent	Earl B. Wadsworth.
Assistant Superintendent	J. W. Sutherin.

B. F. Myers, Traffic Agent	Chicago, Ill.
Joseph Menth, Assistant Traffic Agent	New York, N. Y.
C. H. Kaufeld, Assistant Traffic Agent	Cleveland, Ohio.
A. O. Willoughby, Assistant Traffic Agent	San Francisco, Calif.

FINAL RECORD OF GOVERNMENTAL OPERATIONS

Statement of Monthly Performance and Revenue Government Transcontinental Route

(Calendar Year, 1927)

Month	Excess Postage	Miles Mail Trips Scheduled	Miles Traveled with Mail	Per Cent of Performance
January	\$82,212.96*	164,711	147,005	89.25
February		150,361	136,781	90.97
March		168,220	152,503	90.66
April		160,217	148,250	92.53
May		166,927	162,494	97.34
June		167,896	165,998	98.87
July		44,826	44,581	99.45
August		44,826	43,305	96.61
Totals	\$82,212.96	1,067,984	1,000,917	93.72

*Excess postage count discontinued January 31, 1927.

July and August covers only that part of the transcontinental route operated by the Post Office Department, namely—New York to Chicago. The western end Chicago-San Francisco was taken over July 1 by the Boeing Air Transport, Inc.

Statement of Monthly Performance and Revenue New York-Chicago Overnight Route (Government Operation)

January 1 to August 31, 1927

Month	Excess Postage	Mail Carried Letters		Total	Miles Scheduled	Miles Flown	Per Cent of Per- formance
		East	West				
January	\$20,607.65*	272,720	207,480	480,000	42,178	34,372	81.49
February		288,800	154,240	443,040	39,777	31,643	79.55
March		356,600	247,400	604,000	44,427	42,333	95.29
April		322,520	256,040	578,560	42,657	40,303	94.48
May		344,480	287,080	631,560	44,607	41,461	92.95
June		383,120	401,440	784,560	44,106	43,305	98.18
July		325,560	287,000	612,560	44,826	43,056	96.08
August		395,400	327,880	723,280	43,380	43,045	99.23
Totals	\$20,607.65	2,689,200	2,168,560	4,857,760	345,958	319,518	92.36

Report of Revenue and Expenditures

January 1—August 31, 1927**

REVENUE (EXCESS POSTAGE)		\$102,820.61*
EXPENSE		Per- centage
Maintenance of Way		
Fields	\$281,400.43	
Lights	122,436.82	
Communications	72,854.05	
Motor Vehicle	4,688.00	
	\$481,379.30	.479
Maintenance of Equipment		
Rebuilding Planes	\$ 55,387.34	
Rebuilding Motors	39,126.42	
Repairing Field Equipment	10,242.69	
Warehouse	18,008.28	
	\$119,764.73	.119
Transportation		
Pilots' Mileage Pay, Base Pay, Travel		
Expense	\$193,382.15	
Gasoline	96,684.77	
Oil	7,829.31	
Forced Landings	1,175.90	
	\$299,072.13	.297
Executive		
General Superintendent's Office	\$ 24,369.13	
Division Superintendent's Office	17,694.33	
Superintendent Repair Depot	13,390.20	
	\$ 55,453.66	.055
Capital		
New Buildings	\$ 245.22	
New Lighting Equipment	12,694.58	
New Flying Equipment	36,539.76	
New Miscellaneous Equipment	516.04	
Ground Improvement	877.84	
	\$ 50,873.44	.050
GRAND TOTAL	\$1,006,543.26	1.000

The above figures include all expenditures, New York-Chicago night route as well as transcontinental route. No segregation of New York-Chicago night route available.

*Excess postage count discontinued January 31, 1927.

**Extra service operated under contracts after August 31, 1927.

RECAPITULATION, MILES, MAIL CARRIED AND TOTAL REVENUE EARNED

(From Start of Service for which Extra Postage was Charged for Extra Speed, July 1, 1924, to August 31, 1927)

Day	Miles Flown		Total	Number of Letters		Total	Excess Postage
	Day	Night		West	East		
5,072,041		2,751,550	7,823,591	24,743,600	24,471,296	49,214,896	\$2,204,738.29

Miles Flown, Mail Carried and Total Revenue Earned Air Mail Service, January 1 to August 31

(Includes both Transcontinental and New York-Chicago overnight)

Month	Miles Flown		Total	Mail Carried (Letters)		Total	Excess Postage
	Day	Night		West	East		
January	103,598	98,727	202,325	848,200	668,920	1,517,120	\$102,820.61
February	96,197	83,330	179,527	954,040	719,240	1,673,280	
March	125,774	87,194	212,968	1,195,760	919,880	2,115,640	
April	122,811	82,088	204,899	1,133,800	908,960	2,042,760	
May	134,103	79,114	213,217	1,155,200	963,760	2,118,960	
June	138,943	87,515	226,458	1,267,440	1,281,360	2,548,800	
July	58,362	38,036	96,398	703,560	915,480	1,619,040	
August	56,717	42,597	99,314	720,840	998,200	1,719,040	
	836,505	598,601	1,435,106	7,978,840	7,375,800	15,354,640	\$102,820.61

Excess postage count discontinued January 31, 1927.
Entire service under contract after August 31, 1927.

SERVICE RECORD OF PILOTS

Statement Showing Total Number of Hours and Miles Flown by Air Mail Service Pilots, with Dates of Their Entry Into the Service and of Their Last Flights to Aug. 31, 1927, After Which the Entire Service Operated Under Contracts

Pilot	Date of Original Appointment in Service	Date of Last Flight	Total No. of Hours Flown	Total No. of Miles Flown
Allen, Edmund	July 10, 1925	June 29, 1927	1,126.34	109,669
Allison, Ernest M.	Aug. 23, 1920	June 27, 1927	3,806.16	359,793
Barker, Hugh	Jan. 4, 1924	June 13, 1927	1,794.22	170,073
Barnes, J. M.	Aug. 24, 1924	July 14, 1927	1,452.02	139,458
Bertaud, Lloyd W.	Nov. 16, 1924	July 2, 1927	1,443.19	141,806
Biffle, Ira O.	Dec. 9, 1918	June 28, 1927	1,962.37	193,515
Boonstra, Harry G.	Mar. 14, 1921	June 27, 1927	3,238.49	303,428
Bowen, L. L.	July 10, 1925	Apr. 5, 1927	946.07	93,949
Brown, Henry J.	Jan. 12, 1925	Aug. 31, 1927	1,425.17	151,166
Burnside, Frank H.	July 17, 1923	Aug. 31, 1927	1,479.10	147,885
Chandler, Harry A.	Aug. 16, 1920	Aug. 30, 1927	4,132.22	394,605
Collins, Paul F.	Feb. 12, 1921	Aug. 31, 1927	3,587.00	361,689
Collison, H. A.	May 27, 1921	June 19, 1927	3,482.17	331,474
Ellis, Robert H.	July 7, 1919	June 28, 1927	3,388.02	347,518
Hill, James D.	July 1, 1924	July 11, 1927	1,928.36	202,027
Hopson, William C.	Apr. 14, 1920	Aug. 27, 1927	4,943.25	413,034
Huking, Harry	May 3, 1920	June 30, 1927	2,509.17	226,850
Johnson, C. Eugene	Mar. 10, 1921	June 8, 1927	2,525.28	239,356
Johnson, Ralph J.	Aug. 25, 1924	June 26, 1927	1,492.00	140,520
Kaufman, Stephen T.	July 1, 1925	Aug. 31, 1927	1,503.51	149,040
Knight, James H.	June 25, 1919	June 30, 1927	4,282.54	417,072
Lee, Eber H.	Dec. 29, 1918	June 28, 1927	4,220.43	382,426
Levisce, Rexford B.	Nov. 9, 1920	June 30, 1927	3,365.25	320,889
Lewis, Harold T.	May 27, 1919	June 29, 1927	3,840.21	365,625
McGinn, Leo J.	May 10, 1923	Aug. 31, 1927	593.58	60,937
Maroney, Edward S.	Aug. 11, 1921	June 30, 1927	375.09	35,527
Marshall, Tex	Sept. 21, 1920	June 22, 1927	3,675.08	329,152
Milatzo, J. F.	Feb. 24, 1923	Apr. 22, 1927	1,454.32	142,041
Mouton, E. E.	Sept. 8, 1920	May 22, 1927	3,805.54	369,730
Murray, James P.	June 8, 1920	July 11, 1927	4,380.46	400,611
Myers, Geo. I.	June 1, 1923	Sept. 9, 1927	2,782.29	281,114
Pomeroy, Geo. C.	Aug. 16, 1924	Aug. 4, 1927	1,649.24	155,123
Sharpnack, J. W.	Sept. 8, 1920	June 9, 1927	2,256.41	217,212
Short, Shirley J.	Mar. 21, 1923	Aug. 31, 1927	2,841.43	284,552
Smith, Dean C.	May 21, 1920	Aug. 28, 1927	3,764.57	365,719
Smith, Harry G.	Aug. 31, 1920	Aug. 29, 1927	2,770.11	265,164
Smith, W. L.	Nov. 8, 1919	June 15, 1927	4,029.26	391,686
Vance, C. K.	Apr. 22, 1920	June 30, 1927	2,811.58	268,094
Wagner, R. L.	Apr. 23, 1923	June 30, 1927	2,345.24	235,551
Ward, Earl F.	Dec. 27, 1923	Aug. 31, 1927	2,166.08	226,722
Webster, J. O.	Jan. 3, 1921	Aug. 31, 1927	1,444.24	132,986
Williams, W. D.	Aug. 10, 1920	Aug. 29, 1927	4,336.05	424,294
Winslow, B. H.	Sept. 22, 1920	June 30, 1927	2,885.57	256,553
Yager, F. R.	Aug. 10, 1920	June 27, 1927	4,009.14	391,616

CONTRACT AIR MAIL SERVICE

Rate of Postage

Effective February 1st, 1927, a flat rate of 10 cents per half ounce for Air Mail went into effect. This did away with the practice of "zoning" Air Mail matter over the transcontinental and overnight routes, and also the different rates applying to Contract Air Mail routes.

Kelly Bill

At the time of publication, the Post Office Department, under authority of the Kelly law, the text of which is appended as amended June 3rd, 1926, had contracted for the private operation of sixteen air mail routes:

A BILL

To encourage commercial aviation and to authorize the Postmaster General to contract for Air Mail service.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that this Act may be cited as the Air Mail Act.

Sec. 2. That when used in this Act the term "air mail" means first class mail prepaid at the rates of postage herein described.

Sec. 3. That the rates of postage on air mail shall not be less than 10 cents for each ounce or fraction thereof.

Sec. 4. That the Postmaster General is authorized to contract with any individual, firm, or corporation for the transportation of air mail by aircraft between such points as he may designate, and to further contract for the transportation by aircraft of first-class mail other than air mail at fixed rates per pound, including equipment, under such rates, rules, and regulations as he may prescribe, not exceeding \$3 per pound for air mail for the first 1,000 miles and not to exceed 30 cents per pound additional for each additional 100 miles or fractional part thereof for routes in excess of 1000 miles in length, and not exceeding 60 cents per pound for first-class mail other than air mail for the first 1,000 miles, and not to exceed 6 cents per pound additional for each additional 100 miles or fractional part thereof for routes in excess of 1,000 miles in length. Existing contracts may be amended by the written consent of the contractor and the Postmaster General to provide for a fixed rate per pound, including equipment, said rate to be determined by multiplying the rate hereinabove provided by a fraction, the numerator of which is the per cent of revenues derived from air mail to which the contractor was previously entitled under the contract, and the denominator of which is 80.

Sec. 5. That the Postmaster General may make such rules, regulations and orders as may be necessary to carry out the provisions of this Act: *Provided*, That nothing in this Act shall be construed to interfere with the postage charged or to be charged on Government operated air-mail routes.

Air Mail Operations 1927 by Routes

(Calendar Year)

Route	Route Miles	Pounds of Mail	Compensation	Miles of Service Scheduled	Miles of Service Flown	Per Cent of Performance	Per Mile Revenue
1. New York-Boston	192	20,186	\$ 60,560.62	117,504	97,769	83.2	61.9 cts.
2. Chicago-St. Louis	278	34,794	88,255.13	142,892	138,178	96.7	63.9 cts.
3. Chicago-Dallas..	987	109,789	329,366.34	720,510	674,621	93.6	48.8 cts.
4. Salt Lake City-Los Angeles..	600	203,224	609,670.67	438,000	421,045	96.1	\$1.44.8
5. Salt Lake City-Pasco	530	59,972	179,918.61	371,000	318,758	85.9	56.4 cts.
6. Detroit-Cleveland	91	1,724	1,862.99	55,692	52,418	94.1	3.6 cts.
7. Chicago-Detroit..	237	12,291	13,251.11	145,944	132,180	91.1	9.1 cts.
8. Seattle-Los Angeles	1,099	115,086	316,048.11	663,800	609,103	91.8	35.5 cts.
9. Chicago-Minneapolis..	383	27,647	76,029.51	196,963	180,213	91.5	42.1 cts.
11. Cleveland-Pittsburgh	123	19,573	58,719.45	62,730	59,440	95	98.9 cts.
12. Cheyenne-Pueblo	199	36,193	103,032.51	145,270	140,217	96.5	73.5 cts.
17. New York-Chicago	723	172,851	205,861.60	352,824	301,156	85.41	68.4 cts.
18. Chicago-San Francisco	1,904	286,712	608,279.66	702,480	688,558	98.02	88.3 cts.
20. Buffalo-Cleveland	452	329	365.40	5,220	3,052	58.47	11.9 cts.
24. Chicago-Cincinnati ..	270	1,043	1,533.76	8,100	6,516	80.44	25 cts.
Total	8,068	1,101,414	\$2,552,755.47	4,128,029	3,823,214	92.6	66.77 cts.

Consolidated Statistical Report for Fiscal Year Ending June 30, 1927

MONTH (All Routes)	Length of Routes (Miles)	Frequency (Rd. Trips per Month Scheduled)	MILES OF SERVICE		Total Weight of Mails Dispatched (Pounds)	Amount Paid to Contractor
			Scheduled	Actually Flown		
July, 1926	3,912	298½	222,370	214,585	29,673	\$ 82,619.12
August	3,912	299½	220,284	214,368	32,404	91,367.70
September	5,301	307	253,370	233,575	35,246	100,474.42
October	5,551	325	263,865	285,862	42,070	121,908.12
November	5,551	312	293,859	257,057	37,686	109,878.18
December	5,273	297	291,384	239,433	39,350	114,087.74
January, 1927	4,590	262	248,950	205,612	32,510	93,552.23
February	4,590	240	227,722	191,383	35,037	101,263.52
March	4,590	274	250,908	233,308	42,111	121,987.91
April	4,713	275	251,653	231,998	45,856	133,129.25
May	4,713	298½	262,253	248,109	46,133	133,738.10
June	4,713	298	259,348	250,491	55,026	159,221.53
Totals			3,092,016	2,805,781	473,102	\$1,363,227.82

Additions and Changes:

- CAM: 1 Boston, Mass., to New York, N. Y.—established July 1, 1926.
 13 Philadelphia, Pa., to Washington, D. C.—established July 6, 1926.
 8 Seattle, Wash., to Los Angeles, Calif.—established Sept. 15, 1926.
 10 Extended north to Atlanta, Ga., Sept. 15, 1926.
 13 Discontinued Oct. 9, 1926.
 15 Philadelphia, Pa., to Norfolk, Va., established Oct. 10, 1926.
 15 Discontinued November 30, 1926.
 10 Discontinued December 31, 1926.
 11 Cleveland, Ohio, to Pittsburgh, Pa.—established April 21, 1927.

Private Mail Operators

At the time of publication, the Post Office Department, under authority of the Kelly Act, as amended June 3, 1926, operated contract air mail service over the following routes, and on the schedules here given.

No. C.A.M. 1. Boston, Mass., by Hartford, Conn., to New York, N. Y., 192 miles.
 Contractor: Colonial Air Transport, Inc., 270 Madison Ave., New York, N. Y.
 Compensation: \$3.00 per pound.
 Equipment: 4 Planes—1 Stinson-Detroiter, 200 h.p., 1 Fokker, 200 h.p., 2 Piteairn, 200 h.p.
 Schedule: Leave Boston6:15 p. m. Arrive New York9:15 p. m.
 Leave New York5:00 a. m. Arrive Boston7:50 a. m.

Service began July 1st, 1926.

No. C.A.M. 2. Chicago to Peoria and Springfield, Ill., to St. Louis, Mo., 278 miles.
 Contractor: Robertson Aircraft Corporation, Anglum, Mo.
 Compensation: \$2.53125 per pound.
 Equipment: 10 Planes D. H.-4's, 400 h.p., Douglas 400 h.p., Standard and Waco 90 h.p.
 Schedule: Leave Chicago 5:30 a. m. (daily except Sunday and Monday).
 Leave Peoria7:25 a. m. Leave St. Louis daily
 Leave Springfield8:15 a. m. except Saturday and
 Arrive St. Louis9:15 a. m. Sunday4:15 p. m.
 Leave Peoria6:10 p. m.
 Arrive Chicago7:30 p. m.

(To connect overnight plane for New York.)

Service began April 15th, 1926.

No. C.A.M. 3. Chicago, by Moline, Ill., St. Joseph and Kansas City, Mo., Wichita, Kan., and Oklahoma City, Okla., and Fort Worth to Dallas, Texas, 987 miles.
 Contractor: National Air Transport, Inc., Chicago, Ill.
 Compensation: \$3.00 per pound.
 Equipment: In connection with New York-Chicago route, 18 Douglas, 8 Travelair, 7 Curtiss Carrier Pigeons, 1 Tri-Motored Ford and 1 Mercury (Douglas and Curtiss 400 h.p., Travelair 200 h.p.).
 Schedule: Leave Chicago Daily .. 8:00 p. m. Leave Dallas daily ex-
 Leave Moline 7:35 a. m. cept Sunday 7:45 a. m.
 Leave St. Joseph10:35 a. m. Leave Fort Worth 8:00 a. m.
 Leave Kansas City11:18 a. m. Leave Oklahoma City.....10:10 a. m.
 Leave Wichita 1:18 p. m. Leave Wichita11:57 a. m.
 Leave Oklahoma City... 3:05 p. m. Leave Kansas City.... 1:57 p. m.
 Leave Fort Worth 5:15 p. m. Leave St. Joseph..... 2:40 p. m.
 Arrive Dallas 5:35 p. m. Leave Moline 5:40 p. m.
 Arrive Chicago 7:20 p. m.

Service began May 12th, 1926.

No. C.A.M. 4. Salt Lake City, Utah, by Las Vegas, Nev., to Los Angeles, Calif., 600 miles.
 Contractor: Western Air Express, Inc., 801 W. M. Garland Bldg., Los Angeles, Calif.
 Compensation: \$3.00 per pound.
 Equipment: Douglas, Fokker and Stearman planes.
 Schedule: Leave Salt Lake City Leave Los Angeles
 daily9:10 a. m. daily 7:35 a. m.
 Leave Las Vegas.....2:25 p. m. Leave Las Vegas.....10:40 a. m.
 Arrive Los Angeles...5:25 p. m. Arrive Salt Lake City.. 3:20 p. m.

Service began April 17th, 1926.

No. C.A.M. 5. Salt Lake City, Utah, by Boise, Idaho, to Pasco, Wash., 435 miles.
 Contractor: Walter T. Varney, 1540 Pine Street, San Francisco, Calif.
 Compensation: \$3.00 per pound.
 Equipment: 5 Swallow Planes—1 Stearman.

	Westbound (Daily)	Eastbound (Daily)
Schedule:	Leave Salt Lake City, Utah 9:45 a. m.	Leave Pasco, Wash. 6:00 a. m.
	Leave Boise, Idaho.... 1:15 p. m.	Leave Boise, Idaho..... 9:20 a. m.
	Arrive Pasco, Wash.... 4:35 p. m.	Arrive Salt Lake City, Utah .....12:50 p. m.

Service began April 6th, 1926.

No. C.A.M. 6. Detroit, Mich., to Cleveland, Ohio, 91 miles.
 Contractor: Ford Motor Company, Dearborn, Mich.
 Compensation: 6¼ cents per ounce of mail carried.
 Equipment: 6 Planes—4 Ford-Stout, 400 h.p., 2 Ford-Stout, 200 h.p. (each motor).
 Schedule: Leave Detroit 10:40 a. m. (daily except Sunday and Holidays).
 Arrive Cleveland 12:15 p. m. Leave Cleveland 2:30 p. m.
 Arrive Detroit 4:05 p. m.

Service began February 15th, 1926.

No. C.A.M. 7. Detroit, Mich., to Chicago, Ill., 237 miles.
 Contractor: Ford Motor Company, Dearborn, Mich.
 Compensation: 6¼ cents per ounce of mail carried.
 Schedule: Leave Detroit daily except Sunday and Holidays. Leave Chicago 8:00 a. m.
 days 3:15 p. m. Arrive Detroit 11:40 a. m.
 Arrive Chicago 5:00 p. m.

Service began February 15th, 1926.

No. C.A.M. 8. Seattle, Wash., by Portland and Medford, Ore., San Francisco, Fresno, and Bakersfield to Los Angeles, Calif., 1,099 miles.
 Contractor: Vern C. Gorst, North Bend, Ore. (Pacific Air Transport, Inc.).
 Compensation: \$2.8125 per pound for first 1,000 miles, \$3.09375 for entire length of route.
 Equipment: 2 Fokker, Universal Cabin, Monoplanes, 5 Travelair Biplanes, 2 Ryan Monoplanes, 1 Romair Biplane.
 Schedule: Leave Seattle daily except Monday 3:45 a. m. Leave Los Angeles 12:01 a. m.
 Leave San Francisco 12:00 noon Leave San Francisco 5:30 a. m.
 Arrive Los Angeles 5:00 a. m. Arrive Seattle 2:00 p. m.

Service began September 15th, 1926.

No. C.A.M. 9. Chicago, Ill., by Milwaukee and LaCrosse, Wis., to St. Paul and Minneapolis, Minn., 377 miles.
 Contractor: Northwest Airways, Inc., 1st Nat'l Bank Bldg., Detroit, Mich.
 Compensation: \$2.75 per pound.
 Equipment: 3 Stinson-Detrolter Planes, 200 h.p.
 Schedule: Leave Chicago 5:45 a. m. Leave St. Paul 2:40 p. m.
 Arrive St. Paul 10:40 a. m. Arrive Chicago 7:15 p. m.

Service began June 7th, 1926.

No. C.A.M. 11. Cleveland, Ohio, to Pittsburgh, Pa., 120 miles.
 Contractor: Clifford Ball, 503 Standard Life Bldg., Pittsburgh, Pa.
 Compensation: \$3.00 per pound.
 Schedule: Lv. Cleveland, 12:15 p. m.; Youngstown, Ohio, 1 p. m.; arrive Pittsburgh, 1:45 p. m.
 Lv. Pittsburgh, 2:30 p. m.; Youngstown, Ohio, 3:15 p. m.; arrive Cleveland 4 p. m.

Service began April 21, 1927.

No. C.A.M. 12. Cheyenne, Wyo., by Denver and Colorado Springs, to Pueblo, Colo., 199 miles.
 Contractor: Western Air Express, Inc., 113 W. 9th St., Los Angeles, Calif.
 Compensation: 83 cents per pound.
 Equipment: Douglas, Fokker and Stearman Planes.
 Schedule: Leave Cheyenne 5:30 a. m. Leave Pueblo 4:15 p. m.
 Arrive Pueblo 8:30 a. m. Arrive Cheyenne 7:15 p. m.

Service began May 31st, 1926.

No. C.A.M. 16. Cleveland, by Akron, Columbus, Dayton, Cincinnati, Ohio to Louisville, Ky., 339 miles.
 Contractor: Continental Air Lines, Inc., 1259 Union Trust Bldg., Cleveland, Ohio.
 Compensation: \$1.22 per pound.

Schedule and date service begins not yet determined.

No. C.A.M. 17. New York, N. Y., via Cleveland, Ohio to Chicago, Ill., and return, 723 miles.
 Contractor: National Air Transport, Inc., Room 620, 506 S. Wabash Ave., Chicago, Ill.
 Compensation: \$1.24 per lb., subject to discounts from 5 per cent to 40 per cent for certain weights carried in excess of 1,500 lbs.
 Equipment: In connection with Chicago-Dallas Route, 18 Douglas, 8 Travelair, 7 Curtiss Carrier Pigeons, 1 Tri-Motored Ford and 1 Mercury (Douglas and Curtiss 400 h.p., Travelair 200 h.p.).

Schedule:	Over- night	Transcon- tental		Transcon- tental	Over- night
	8:00 p. m.	11:00 a. m.	Lv. New York, N. Y. Ar. (P. R. R. Station)	7:00 p. m.	6:15 a. m.
	9:35 p. m.	12:15 p. m.	New Brunswick, N. J. (Hadley Field)	4:45 p. m.	4:45 a. m.
	2:15 a. m.	4:20 p. m.	Ar. Cleveland Ohio Lv.	12:15 p. m.	12:15 a. m.
	2:30 a. m.	4:35 p. m.	Lv. Ar.	12:00 m.	12:00 m.
	5:35 a. m.	7:00 p. m.	Ar. Chicago Ill. Lv.	8:00 a. m.	8:00 p. m.

No. C.A.M. 18. Chicago, Ill., via Iowa City and Des Moines, Iowa, Omaha and North Platte, Neb., Cheyenne and Rock Springs, Wyo., Salt Lake City, Utah, Elko and Reno, Nevada, and Sacramento to San Francisco, Calif., and return, 1,904 miles.

Contractor: Boeing Air Transport, Inc., Georgetown Station, Seattle, Wash.
Compensation: \$1.50 per lb. for the first 1,000 miles and 15 cents per pound for each additional 100 miles.

Equipment: 24 Boeing Mail Planes (1600 lbs. pay load), equipped with Pratt & Whitney "Wasp" 410 h.p. engines.

Schedule: *Westbound:* Leave Chicago, 7:50 p. m.; Iowa City, 9:40 p. m.; Omaha, 12:35 a. m.; North Platte, 2 a. m.; Cheyenne, 4:45 a. m.; Rock Springs, 7:05 a. m.; Salt Lake City, 9:20 a. m.; Elko 11:15 a. m.; Reno, 1:45 p. m.; Sacramento, 2:45 p. m.; Oakland, 4:30 p. m.; arriving at San Francisco 5:30 p. m.

Eastbound: Leave San Francisco, 6 a. m.; Oakland, 7 a. m.; Sacramento, 7:45 a. m.; Reno, 9 a. m.; Elko, 11 a. m.; Salt Lake City, 3:05 p. m.; Cheyenne, 7:30 p. m.; Omaha, 12:30 a. m.; Des Moines, 1:30 a. m.; arriving at Chicago, 5:45 a. m.

No. C.A.M. 19. New York, N. Y., via Philadelphia, Pa., Washington, D. C., Richmond, Va., Greensboro, N. C., and Spartanburg, S. C., to Atlanta, Ga., and return, 773 miles.

Contractor: Pitcairn Aviation, Inc., Land Title Bldg., Philadelphia, Pa.

Compensation: \$3.00 per pound.

Schedule: *Southbound:* Leave New York (Hadley Field), 9 p. m.; Philadelphia, 9:40 p. m.; Washington, 11:00 p. m.; Richmond, 12:25 a. m.; Greensboro, 2:25 a. m.; Spartanburg, 4 a. m.; Atlanta, 6 a. m.
Northbound: Leave Atlanta, 9 p. m.; Spartanburg, 11:05 p. m.; Greensboro, 12:20 a. m.; Richmond, 2:40 a. m.; Washington, 3:35 a. m.; Philadelphia, 5:25 a. m.; New York, 6 a. m.

No. C.A.M. 20. Albany, N. Y., via Schenectady, Syracuse, Rochester, Buffalo, N. Y., to Cleveland, Ohio, and return, 174 miles.

Contractor: Colonial Western Airways, Inc., 270 Madison Ave., New York, N. Y.

Compensation: \$1.11 per pound.

Schedule: Lv. Buffalo, N. Y. 2:25 p. m. Lv. Cleveland, Ohio 12:15 p. m.
Ar. Cleveland, Ohio 4:15 p. m. Ar. Buffalo, N. Y. 2:05 p. m.

Service began December 17th, 1927.

No. C.A.M. 21. Dallas, via Houston, to Galveston, Texas, and return, 283 miles.

Contractor: Texas Air Transport, Inc., Fort Worth Club Bldg., Fort Worth, Texas.

Compensation: \$2.80 per pound.

Schedule: Lv. Dallas, Tex. 7:45 a. m. Lv. Galveston, Tex. 4:00 p. m.
Lv. Ft. Worth, Tex. 8:15 a. m. Lv. Houston, Tex. 4:45 p. m.
Lv. Houston, Tex. 10:50 a. m. Lv. Ft. Worth, Tex. 7:15 p. m.
Ar. Galveston, Tex. 11:30 a. m. Ar. Dallas, Tex. 7:37 p. m.

Service began February 6th, 1928.

No. C.A.M. 22. Dallas, via Waco, Austin and San Antonio to Laredo, Tex., and return, 417 miles.

Contractor: Texas Air Transport, Inc., Fort Worth Club Bldg., Fort Worth, Texas.

Compensation: \$2.80 per pound.

Schedule: Lv. Dallas, Tex. 7:45 a. m. Lv. San Antonio, Tex. 4:15 p. m.
Lv. Ft. Worth, Tex. 8:15 a. m. Lv. Austin, Tex. 5:10 p. m.
Lv. Waco, Tex. 9:20 a. m. Lv. Waco, Tex. 6:15 p. m.
Lv. Austin, Tex. 10:25 a. m. Lv. Ft. Worth, Tex. 7:15 p. m.
Ar. San Antonio, Tex. 11:15 a. m. Ar. Dallas, Tex. 7:37 p. m.

Service began February 6th, 1928.

No. C.A.M. 23. Atlanta, Ga., via Birmingham and Mobile, Ala., to New Orleans, La., and return, 478 miles.

Contractor: St. Tammany Gulf Coast Airways, Inc., Room R, Mezzanine Floor, Roosevelt Hotel, New Orleans, La.

Compensation: \$1.75 per pound.

No. C.A.M. 24. Chicago, Ill., via Indianapolis, Ind., to Cincinnati, Ohio and return, 270 miles.

Contractor: Embry-Riddle Company, Lunken Airport, Cincinnati, Ohio.

Compensation: \$1.47 per pound.

Equipment: 3 Whirlwind Wacos (mail planes), 1 Hissco Waco (mail plane), 1 Ryan Cabin Monoplane; 3 OX5 Wacos; 1 Hissco Waco.

Schedule: Lv. Cincinnati daily... 3:45 p. m. Lv. Chicago daily... 6:00 a. m.
Lv. Indianapolis... 4:00 p. m. Lv. Indianapolis... 7:55 a. m.
Ar. Chicago... 5:45 p. m. Ar. Cincinnati... 10:00 a. m.

Service began December 17th, 1927.

No. C.A.M. 25. Atlanta, Ga., via Jacksonville, to Miami, Fla., and return, 595 miles.

Contractor: Pitcairn Aviation, Inc., Land Title Bldg., Philadelphia, Pa.

Compensation: \$1.46 per pound.

No. C.A.M. 26. Great Falls, via Helena and Butte, Mont., and Pocatello, Idaho, to Salt Lake City, Utah, and return, 493 miles.

Contractor: Alfred Frank, Salt Lake City, Utah.

Compensation: \$2.47½ per pound.

Chronology of United States Air Transport

Route miles	Service began	Latest schedule	Present operator	Present service
Chicago-New York... 712	7/1/19	Dly. & Nly....	National Air Transport....	M.P.E.
San Francisco-Chi.... 1,949	9/8/20	Daily	Boeing Air Transport....	M.P.E.
Seattle-Victoria... 77	10/15/20	Varies	Northwest Air Service....	M.P.
Pilottown-N. Orleans... 75	4/9/23	Varies	New Orleans Air Line....	M.
San Diego-L. Angeles 115	3/1/25	.....	Discontinued	
Key Largo-Key West... 110	1/1/26	.....	Discontinued	
Detroit-Cleveland... 155	2/15/26	6 dys. wk....	Ford Motor Company....	M.E.
Detroit-Chicago... 252	2/15/26	6 dys. wk....	Ford Motor Company....	M.E.
Miami-Atlanta... 740	4/1/26	6 dys. wk....	Discontinued	
Salt Lake City-Pasco... 540	4/6/26	Daily	Walter T. Varney....	M.
St. Louis-Chicago... 268	4/15/26	5 dys. wk....	Robertson Aircraft Co....	M.P.
L. Angeles-S. L. City 633	4/17/26	Daily	Western Air Express....	M.P.E.
Dallas-Chicago... 995	5/12/26	Nightly	National Air Transport....	M.P.E.
Pueblo-Cheyenne... 200	5/31/26	Daily	Western Air Express....	M.P.
Chi. Mpls., St. Paul... 399	6/7/26	5 dys. wk....	Northwest Airways....	M.P.
New York-Boston... 219	7/1/26	6 dys. wk....	Colonial Air Transport....	M.P.E.
Norfolk-Philadelphia... 234	7/6/26	Twice dly....	Discontinued	
Detroit-Grand Rapids... 140	8/2/26	6 dys. wk....	Discontinued	
Los Angeles-Seattle... 1,080	9/15/26	6 dys. wk....	Pacific Air Transport....	M.P.E.
Detroit-Buffalo... 218	3/28/27	6 dys. wk....	Ford Motor Company....	E.
Pittsburgh-Cleveland... 121	4/21/27	Daily	Clifford Ball	M.
Louisville-Cleveland... 345	5/18/27	6 dys. wk....	Discontinued	
Detroit-Cleveland... 155	9/1/27	Twice dly....	Stout Air Services....	P.
Key West-Havana... 104	10/28/27	Daily	Pan-American Airways....	M.P.
San Diego-Los Angeles 115	11/1/27	Daily	Maddux Air Lines....	P.
Tucson-Los Angeles... 440	11/28/27	3 dys. wk....	Aero Corp. of Calif....	P.E.
Cleveland-Buffalo... 177	12/17/27	Daily	Colonial West'n Airways... M.P.	
Cincinnati-Chicago... 267	12/17/27	Daily	Embry-Riddle Co....	M.
San Antonio-Dallas... 251	2/6/28	Daily	Texas Air Transport....	M.
Galveston-Dallas... 267	2/6/28	Daily	Texas Air Transport....	M.

NOTE: P—Passenger; E—Express; M—Mail.

Mail Routes Contracted But Not in Operation Yet

Atlanta-New York... 763	Pitcairn Aviation....	M.
Miami-Atlanta... 622	Pitcairn Aviation....	M.
New Orleans-Atlanta... 483	St. Tam. Gulf Coast Airways....	M.
Louisville-Cleveland... 345	Continental Air Lines....	M.
Salt Lake-Great Falls... 489	Alfred Frank....	M.

AIR EXPRESS RATES

The rates shown below are stated in cents per quarter pound (4 ounces) and are based upon a measurement of not more than 50 cubic inches to each quarter pound and upon a valuation of not to exceed \$50.00 for packages weighing less than 100 pounds or 50 cents per pound actual weight for packages weight over 100 pounds. Charges must be computed separately for each package when shipments consist of more than one package. Fractional weights of less than four ounces will be considered as one quarter pound in computing charges.

Rates in Cents per Quarter Pound (four ounces or fraction thereof).

FROM	TO															
	Boston	Cheyenne	Chicago	Cleveland	Dallas	Des Moines	Elko	Forth Worth	Hartford	Iowa City	Kansas City	Las Vegas	Los Angeles	Moline ²	New York ¹	North Platte
Boston, Mass.	..	75	50	50	60	60	75	60	40	60	60	75	60	60	40	75
Cheyenne, Wyo.	75	..	60	65	..	60	60	..	75	60	..	50	50	50	65	50
Chicago, Ill.	50	60	..	25	40	25	60	40	50	25	60	60	25	25	60	40
Cleveland, Ohio	50	65	25	..	50	50	65	50	50	50	65	65	40	25	65	50
Dallas, Tex.	60	..	40	50	..	..	..	25	60	..	40	..	40	50	..	25
Des Moines, Iowa	60	60	25	50	..	..	60	..	60	25	..	60	60	..	50	60
Elko, Nev.	75	50	60	65	..	60	..	..	75	60	..	..	..	65	50	..
Forth Worth, Tex.	60	..	40	50	25	..	..	60	..	..	40	..	40	50	..	25
Hartford, Conn.	40	75	50	50	60	60	75	60	..	60	60	75	60	40	75	60
Iowa City, Iowa	60	60	25	50	..	25	60	..	60	..	..	60	60	..	50	60
Kansas City, Mo.	60	..	25	50	40	..	..	40	60	..	..	..	25	50	..	25
Las Vegas, Nev.	75	50	60	65	..	60	..	..	75	60	..	..	50	..	65	50
Los Angeles, Calif.	75	50	60	65	..	60	..	75	60	..	50	..	..	65	50	..
Moline, Ill. ²	60	..	25	40	40	..	40	60	..	25	..	..	..	40	..	40
New York, N. Y. ¹	40	65	25	25	50	50	65	50	40	50	65	65	40	..	65	50
North Platte, Neb.	75	50	60	65	..	60	50	..	75	60	..	50	..	65	..	65
Oklahoma City, Okla.	60	..	40	50	25	..	25	60	..	25	..	40	50	..	..	50
Omaha, Neb.	60	50	25	50	..	25	50	60	25	..	50	50	..	40	50	50
Ponca City, Okla.	60	..	40	50	25	..	25	60	..	25	..	40	50	..	25	..
Reno, Nev.	75	50	60	65	..	60	50	..	75	60	..	..	..	65	50	..
Rock Springs, Wyo.	75	50	60	65	..	60	50	..	75	60	..	50	..	65	50	..
Sacramento, Calif.	75	50	65	65	..	60	50	..	75	60	..	..	..	65	50	..
St. Joseph, Mo.	60	..	25	50	40	..	40	60	..	25	..	..	25	50	..	25
Salt Lake City, Utah	75	50	60	65	..	60	50	..	75	60	..	50	..	65	50	..
San Francisco, Calif.	75	50	60	65	..	60	50	..	75	60	..	..	..	65	50	..
Wichita, Kan.	60	..	40	50	25	..	25	60	..	25	..	..	40	50	..	..

¹ New York rates will also apply to and from New Brunswick, N. J.

² Moline rates will also apply to and from Davenport, Iowa, Rock Island, Ill., and East Moline, Ill.

³ San Francisco rates will also apply to and from Oakland, Calif.

AIRCRAFT APPROPRIATIONS, UNITED STATES

1922-1928

		Total	Increase or Decrease	Net
1922-23	Army	12,895,000	†6,305,000	
	Navy	14,683,590	*1,270,159	
	Air Mail	1,900,000	*650,000	
	N.A.C.A.	210,000	*10,000	
		29,688,590		
1923-24	Army	12,426,000	†469,000	†4,347,841
	Navy	14,647,174	†36,416	
	Air Mail	1,500,000	†400,000	
	N.A.C.A.	283,000	*73,000	
		28,856,174		
1924-25	Army	14,113,043.80	*1,687,043.80	†832,416
	Navy	15,150,000	*502,826	
	Air Mail	2,750,000	*1,250,000	
	N.A.C.A.	470,000	*187,000	
		32,483,043.80		
1925-26	Army	14,700,000**	*586,956.20	*3,626,869.80
	Navy	14,700,000†	†360,000	
	Air Mail	2,810,000††	†150,000	
	N.A.C.A.	534,000	*64,000	
		32,624,000		
1926-27	Army	15,050,000	*350,000	*350,956.20
	Navy	18,505,288	*3,715,288	
	Air Mail	2,650,000††	†160,000	
	N.A.C.A.	513,000	†21,000	
		36,718,288***		
1927-28	Army	20,396,300	*5,346,300	*3,884,288
	Navy	20,100,000	*1,594,712	
	N.A.C.A.	513,000		
	Commerce	3,791,500	*3,291,500	*10,219,512

*Increase over preceding year.

†Decrease from preceding year.

**Plus \$2,150,000 "contract authorizations" for additional purchases of aircraft.

†Plus \$4,100,000 "contract authorizations" for additional purchases of aircraft.

***Plus \$6,250,000 "contract authorizations" for additional purchases of aircraft.

††For the contract Air Mail Service \$500,000 was appropriated for 1926 and \$2,000,000 was allowed for 1927.

NOTE.—The budget for the fiscal year 1928-1929 recommends the following items: Army, \$32,939,800; Navy, \$25,035,562; National Advisory Committee for Aeronautics, \$587,000; Department of Commerce, \$4,361,850.

In addition to appropriations for 1927 additional contract authorizations for aircraft purchases have been made as follows: Army, \$4,495,000; Navy, \$9,480,000.

PRODUCTION OF COMMERCIAL AIRPLANES AND SEAPLANES REPORTED FOR 1927

Manufacturer	Plane	Engine	Production		Total
			Open	Closed	
Advance Aircraft Co.....	Waco 10	OX-5	350	.....	454
	Waco 10	I-5	19	.....	.....
	Waco 10	Siemens	4	.....	.....
	Waco 10	Hisso	1	.....	.....
	Waco 10	OX-6	15	.....	.....
	Waco 9	OX-5	65	.....	.....
Alexander Aircraft Co.....	Eaglerock	OX-5	205	.....	206
	Eaglerock	J-5	1	.....	.....
Allison Airplane Co.....		OX-5	12	.....	12
American Eagle Aircraft Co.,		OX-5	92	.....	92
Atlantic Aircraft Corp.....	Universal	J-5	.....	23	.....
	Tri-Motor	3-J5	.....	9	.....
	F-7-A	Jupiter	.....	1	.....
	Super Uni- versal	Wasp	.....	2	35
Bellanca Aircraft Corp.....	Special		.....		
	Model "P"	I-5	.....	1	1
Boeing Airplane Co.....	40 A-Mail	Wasp	26	.....	26
Breese Aircraft Corp.....	No. 5	J-5	.....	6	6
Buhl Aircraft Co.....			13	8	21
Central States Aero Co.....	Monocoupe	Air Cat	.....	22	22
G. Elias & Bro.....	Airmobile	Liberty	.....	1	1
Fairchild Airplane Mfg. Co...	F-C-2	J-5	.....	43	50
	F-C-2	C-6	.....	4	.....
	F-C-2 W	Wasp	.....	3	.....
Hamilton Metalplane Co.....		I-5	.....	1	1
Heath Airplane Co.....	Parasol	Henderson	15	.....	15
		Anzani			
		Bristol			
International Aircraft Co....			32	.....	32
Ireland Aircraft, Inc.....	Neptune	I-5	1	.....	1
Irwin Aircraft Co.....	Meteor	Irwin	6	.....	6
	Pathfinder	3-J5	.....	1	.....
Keystone Aircraft Corp.....	Pronto	I-5	6	.....	.....
	Puffer	J-5	2	.....	9
Kreider-Reisner Aircraft, Inc.,	Challenger	OX-5	9	.....	9
Lincoln Aircraft Co.....	LS-5	Hispano- Suiza			
		Hisso			
		OX-5	40	.....	40
National Airways System, Inc.,		OX-5	55	.....	55
Nicholas-Beazley Airplane Co.,	Rebuilt	Hispano- Suiza			
	Standard J-1	OX-6 and OX-5	60	.....	60
		OX-5			
Pheasant Aircraft Co., Inc....		OX-5	11	.....	11
Pittcairn Aviation Co.....	PA-3	OX-5	30	.....	49
	PA-3	K-6	2	.....	.....
	PA-4	OX-5	5	.....	.....
	PA-5	J-5	12	.....	.....
Prudden-San Diego Airplane Co.	3-RS		.....	1	1
Sikorsky Mfg. Co.....	S-36	2-J5	1	4	7
	S-37		.....	2	.....
Stinson Aircraft Corp.....	Monoplane	J-5	.....	36	.....
	Biplane	J-5	.....	19	55
Stout Metal Airplane Co.....	Tri-Motor				
	Monoplane	Wright "Whirlwind"	.....	11	11
Swallow Airplane Co.....	Swallow	OX-5	100	.....	.....
	Swallow	Hisso	3	.....	.....
	Monoplane	J-5	.....	1	104
Travel Air Mfg Co.....	No. 2000	OX-5	126	.....	158
	No. 3000	Hisso	4	.....	.....
	No. 4000	I-5	14	.....	.....
	No. 5000	J-5	.....	14	.....
Miscellaneous	Experimental		8	7	15
			1,346	219	1,565

EXPORTS OF AIRCRAFT, ENGINES AND PARTS

Detailed statistics showing the exports of aircraft, aircraft engines and parts except tires, which have been prepared in the Transportation Division of the Department of Commerce indicate that the total exports for 1927 valued at \$1,903,560 were 85 per cent greater than those valued at \$1,027,210 in 1926, and 143 per cent greater than the total of \$783,659 for 1925. The principal markets in 1927 were Canada, Peru, Chile and Soviet Russia in Europe, while in the immediately preceding year the four leading markets were the United Kingdom, Soviet Russia in Europe, Peru and Mexico in order.

Although the number of airplanes amounting to 80 and valued at \$511,282 for 1925 was reduced to 50 valued at \$303,149 for 1926, it increased in 1927 to 63 valued at \$848,568. The increased unit value is strikingly noticeable. The 1926 exports of engines for aircraft increased largely over those for 1925 and were some smaller for 1927, when 84 valued at \$484,875 were exported. The remaining item "parts except tires" shows a consistent increase, with values of \$101,584, \$150,329 and \$570,117 in the years 1925, 1926, and 1927.

It will be noticed that less than one-half of the total 1927 export value was made up of complete airplanes, seaplanes and other aircraft and that parts except tires had a larger value than the exports of engines.

As will be indicated by the tables attached, the distribution of engines and of parts is much wider than that of completed airplanes, they being purchased in the manufacturing countries of Europe as well as the non-manufacturing countries of South America and the Far East. The larger numbers of completed aircraft are going to the non-manufacturing countries and largely to American countries. The detailed items indicate something of the wide possibilities open to the large numbers of manufacturers of engines and parts.

United States Domestic Exports of Aircraft and Parts for 1927

Figures Subject to Revision

Countries	Engines for aircraft		Airplanes, seaplanes and other aircraft		Parts, except tires	Total by country
	Number	Dollars	Number	Dollars	Dollars	Dollars
Belgium	5	71,103	2	28,000	.....	99,103
Germany	7	76,508	..	.....	3,861	80,369
Netherlands	1	2,500	3	17,075	402	19,977
United Kingdom	..	.....	..	.....	42,717	42,717
Canada	31	105,504	26	197,021	142,249	444,774
Dominican Republic	2	5,525	..	.....	5,098	10,623
Colombia	..	.....	2	63,800	4,014	67,804
Peru	3	3,718	8	190,111	149,388	343,217
China	6	29,193	..	.....	18,664	47,857
Tava and Madura	..	.....	..	.....	1,217	1,217
Japan, Inc. Chosen	5	28,193	2	49,112	514	77,819
Philippine Islands	..	.....	2	40,623	624	41,247
Australia	3	5,410	3	17,441	7,604	30,455
Siam	4	38,000	..	.....	11,014	38,000
Cuba	..	.....	3	14,162	.....	25,176
Italy	2	21,088	1	10,001	3,498	34,458
Mexico	..	.....	..	.....	211	211
Guatemala	..	.....	..	.....	75	75
Netherlands East Indies	..	.....	1	8,875	5,508	10,399
Argentina	1	5,016	7	187,500	34,948	222,448
Chile	1	339	..	.....	.....	339
British India	..	.....	1	16,239	1,660	17,899
Other Br. W. Indies	..	.....	1	8,350	1,293	14,888
Brazil	1	5,245	..	.....	117,139	175,528
Honduras	4	58,359	..	.....	2,080	2,080
Sov. Russia in Europe	1	4,610	..	.....	865	5,475
Norway	..	.....	..	.....	4,824	4,824
France	1	10,000	..	.....	.....	10,000
Panama	1	4,100	..	.....	.....	4,100
Switzerland	1	409	..	.....	.....	409
Spain	1	365	..	.....	.....	365
British Malaya	1	4,610	1	168	70	4,848
Venezuela	1	790	..	.....	3,189	3,979
Czechoslovakia	..	.....	..	.....	3,701	3,701
British So. Africa	1	4,260	..	.....	.....	4,260
Newfoundland & Labrador	..	.....	..	.....	120	120
Poland & Danzig	..	.....	..	.....	.....	.....
Denmark & Faroe Is.	..	.....	..	.....	.....	.....
Total for 1927	84	484,875	63	848,568	570,117	1,903,560
Three years (1925-27)	454	1,229,400	193	1,662,999	822,030	3,714,429

DIRECTORY OF AIRCRAFT OPERATORS

Taxi, Sightseeing, Advertising, Photography, Dusting, Flying Instruction, Etc.

NOTE:—The Aeronautical Chamber of Commerce prints the following list of operators upon authority of the operators themselves, hence assumes no responsibility for accuracy of statement. There are, of course, other operators who cannot be included in this tabulation because of their failure to report on their flying activities. The following condensation covers number of craft, miles flown, number of passengers (exclusive of pilots) and pounds of freight carried and indicates whether operator gives flying instruction and whether or not he is equipped for aerial photography. All operators, in 1927 flew cross country. This tabulation does not include statistics of Air Transport Operators flying on schedule, nor of the flying done by aircraft manufacturers in test or demonstration. For further information apply to Aeronautical Chamber of Commerce of America, 300 Madison Ave., New York.

Alaska

FAIRBANKS

WIEN ALASKA AIRWAYS, Two planes, 16,675 miles. 235 passengers. Rates—Hops, \$10; trips, \$1 per mile.

Alabama

BIRMINGHAM

GLENN E. MESSER, 1338 So. 15th Ave. Two planes. 20,967 miles. 1,625 passengers. Rates—Hops, \$5; trips, 50 cents per mile.

Arizona

TUCSON

C. W. MAYSE, Mayse Airport. Four planes. 25,000 miles. 500 passengers. Rates—Hops, \$2.50; trips, \$25 per hour.

Arkansas

FORT SMITH

FORT SMITH AIRCRAFT CO., 27 So. 6th St. Two planes. 10,000 miles. 400 passengers. Rates—Hops, \$3; trips, 20 cents per mile.

LITTLE ROCK

ARKANSAS AIRCRAFT CO., A. O. U. W. Bldg. Four planes.

PARIS

LELAND F. WILLIAMS. One plane. 11,760 miles. 300 passengers. Rates—Hops, \$3.

California

ALAMEDA

W. A. GEARY, 835 Portala Ave. Two planes. 4,000 miles. 49 passengers. Rates—Hops, \$3.

ARLINGTON

PREST AIRPLANES & MOTORS. 12,675 miles. Rates—Hops, \$2.50.

BAKERSFIELD

ROSE PEACOCK, 2203 Eye St. One plane. Rates—Hops, \$5.

FRESNO

R. F. BROCK, 427 Shields Ave. One plane. 2,000 miles. 15,220 passengers. Rates—Hops, \$2.50.
H. L. MULLIN, Route A, Box 31. One plane. 16,422 miles. Rates—Hops, \$2.50; trips, \$20 per hour.

GLENDALE

KINNER AIRPLANE & MOTOR CORP., Glendale Airport. Three planes. 45,000 miles. 2,540 passengers. Rates—Hops, \$2.50.
BOB STARKEY, 1014 Cumberland Road. Six planes. 12,250 miles. 638 passengers. Rates—Hops, \$2.50; trips, \$25 per hour.
WILSON AERO SERVICE, Glendale Airport. Four planes. 27,000 miles. 650 passengers. Rates—Hops, \$2.50 and \$3.50; trips, \$35 per hour.

IMPERIAL

CECIL A. MEADOWS. One plane. 19,440 miles. 1,257 passengers. Rates—Hops, \$3; trips, 25 cents per mile.

LONG BEACH

EARL S. DOUGHERTY, 2495 Pine Ave. Two planes. 18,000 miles. 737 passengers. Rates—Hops, \$5; trips, 75 cents per mile.
AL EBRITE, 311 West 9th St. Two planes. Rates—Hops, \$5; trips, 20 cents per mile.
J. L. O'DONNELL, Municipal Airport. Three planes. 50,000 miles. 2,000 passengers. Rates—Hops, \$2.50 and \$5; trips, \$20 per hour.

LOS ANGELES

AERO CORPORATION OF CALIFORNIA, 9819 South Western Ave. Ten planes.
AMERICAN AIRCRAFT CORP., 3809 Angeles Mira Drive. Four planes. 75,000 miles. 6,000 passengers. Rates—Hops, \$2.50; trips, 20 and 40 cents per mile.
DYCER AIRPORT, 136th St. and Western Ave. Four planes. 87,514 miles. 1,702 passengers. Rates—Hops, \$1; trips, 17 cents per mile.
PACIFIC MARINE AIRWAYS, INC., 1018 Board of Trade Bldg. Four planes.
RAY AIR SERVICE, 700 Santa Monica Bldg. Two planes.

OAKLAND

AEROGRAPH COMPANY, 324 13th St. One plane. 1,500 passengers. Photography only.
GOLDEN STATE AIRCRAFT CO., 2291 E. 12th St. One plane.

PETALUMA

W. G. FLETCHER, P. O. Box 441. Rates—Hops, \$2.50.

REDLANDS

RAY W. JOHNSON, Three planes. 15,000 miles. 250 passengers. Rates—Hops, \$3; trips, 25 cents per mile.

RIVERSIDE

RIVERSIDE AIRPORT, INC., Mission Blvd. Four planes.

SACRAMENTO

ANDREWS, NICHOLSON & MORRIS, Municipal Airport, Route 10, Box 1707. Two planes.
INGVALD'S SCHOOL OF AVIATION, R. D. 7, Box 1545. Two planes. 33,615 miles. 1,635 passengers. Rates—Hops, \$2.50; trips, \$20 per hour.

SAN DIEGO

B. F. MAHONEY AIRCRAFT CORP. Five planes. 90,000 miles. 6,000 passengers. Rates—Hops, \$2.50 and \$5; trips, \$50 per hour.

SAN FRANCISCO

BREESE FLYING SERVICE, 270 Seventh St. Three planes. Rates—Hops, \$2.50; trips, \$30 per hour.
SUMMIT AIRCRAFT COMPANY, 620 Market St. Four planes. 26,000 miles. 5,262 passengers. Rates—Hops, \$2.50; trips, 50 cents per mile plus 25% for additional passenger and plus 25% for round trip.

SAN MATEO

ROBERT HANCOCK, 401 B St. One plane. 12,000 miles. 125 passengers. Rates—Hops, single \$3; double \$5; trips, \$35 per hour.
VICTOR "SPEED" JOHNSON, P. O. Box 231. Five planes. 525,000 miles. 20,000 passengers. Rates—Hops, \$5; trips, 40 cents per mile.

SANTA ANA

EDDIE J. MARTIN. Four planes. 72,540 miles. 1,790 passengers. Rates—Hops, \$2.50; trips, 8 to 15 cents per mile.

SANTA BARBARA

EARLE OVINGTON, 3030 Samarkand Drive. Three planes.

SANTA MONICA

RAY W. JOHNSON, 700 Santa Monica Blvd. Three planes. 50,000 miles. 300 passengers. Rates—Hops, \$15 per 100 miles; trips, 10 cents per mile.

VISALIA

AMERICAN EAGLE AIRCRAFT DISTRIBUTORS, Visalia Airport. One plane. Rates—Hops, \$2.50; trips, 50 cents per mile.
SOLOMON SWEET, care S. Sweet Co. One plane. Rates—Hops, \$2.50; trips, 20 cents per mile.

Colorado**DENVER**

ALEXANDER AIRCRAFT CO., 3385 So. B'way. Three planes. 100,000 miles. 7,250 passengers. Rates—Hops, \$2.50; trips, 45 cents per mile round trip; 35 cents per mile one way.
ROCKY MOUNTAIN AIRLINES, INC., 607 U. S. Nat'l Bank Bldg. Three planes. 35,000 miles. 1,500 passengers. Rates—Hops, \$2.50; trips, 35 cents per mile.
COLORADO SCHOOL OF AVIATION, 323 Quincy St. 2,000 miles. 1,000 passengers. Rates—Hops, \$3; trips, 25 cents per mile.

LAMAR

ARKANSAS VALLEY AIRWAYS, INC. One plane. Rates—Hops, \$2.50; trips, 15 cents per mile.

Connecticut**HARTFORD**

INTERSTATE AIRWAYS, INC., Brainard Field. One plane. 10,000 miles. 500 passengers. Rates—Hops, \$2.50; trips, 30 cents per mile.
THE L. & H. AIRCRAFT CORP., 98 High St. Three planes. Rates—Hops, \$5; trips, 50 cents per mile.
NEW ENGLAND AIRCRAFT CO., INC., 805 Main St. Three planes. Approx. 100,000 miles. Approx. 1,800 passengers. Rates—Hops, \$2.50; trips, \$40 per hour.

District of Columbia**WASHINGTON**

AVIATION CORPORATION OF AMERICA, 3322 14th St. N. W. One plane. 2,000 miles. 200 passengers. Rates—Hops, \$3; trips, 50 cents per mile.
CAPITAL AIRWAYS, INC., 5315 Colorado Ave. N. W. Five planes. 2,500 passengers. Rates—Hops, \$3; trips, 40 cents per mile.
POTOMAC FLYING SERVICE, INC., Hoover Field, South Washington, Va. Seven planes.

Florida**FT. LAUDERDALE**

MERLE L. FOGG, Ft. Lauderdale. One plane. 2,000 passengers. Rates—Hops, \$5 (15 min.); trips, \$30 per hour.

MIAMI

A. B. CHALK, 368 N. E. 57th St. Two planes. Rates—Hops, \$5; trips, \$40 to \$75 per hour.
ROGERS AIRLINES, INC. Five planes. Rates—Hops, \$5; trips, 75 cents per mile.

PALM BEACH

RAY APPLEGATE, 207 Main St. Two planes. Rates—Hops, \$5; trips, \$50 per hour.

TAMPA

McMULLEN AIRCRAFT CO., 512 Bradford St. Four planes.

Georgia**AMERICUS**

F. W. ELMORE. One plane. 2,145 miles. Rates—Hops, \$2.50; trips, 25 cents per mile.

ATHENS

BEN T. EPPS, 392 Wash. St. One plane. Approx. 500 passengers. Rates—Hops, \$2.50; trips, 50 cents per mile.

ATLANTA

BEELER BLEVINS, INC., P. O. Box 329. Three planes. 30,000 miles. Rates—Hops, \$2.50 and \$5; trips, \$30 and \$50 per hour.

DOUGLAS H. DAVIS, 1439 Copeland Ave. Seven planes. 50,000 miles. 7,000 passengers. Rates—Hops, \$2.50; trips, 35 cents per mile.

GEORGIA AIRCRAFT CO., P. O. Box 329. Three planes.

HAPEVILLE

PITCAIRN AVIATION OF GEORGIA, INC. Four planes.

MACON

MACON FLYING SCHOOL. Three planes. Approx. 7,500 miles. Approx. 900 passengers. Rates—Hops, \$2.50 and \$5; trips, 25 cents per mile.

Idaho**PAYETTE**

INLAND AIRWAYS. Two planes. Rates—Hops, \$5; trips, 30 cents per mile.

Illinois**CHICAGO**

AERIAL PHOTOGRAPHIC SERVICE, 222 E. Ontario St. One plane. 15,000 miles. Photography only.
AVIATION SERVICE & TRANSPORT, INC., 203 N. Wabash Ave. Four planes. 20,000 miles. 250 passengers. Rates—Hops, \$5 (15 min.); trips, 50 cents per mile.

CHICAGO AERIAL SURVEY CO., 332 S. Michigan Ave. One plane.
CHICAGO AERONAUTICAL SERVICE, INC., 608 S. Dearborn St. Four planes. 25,000 miles. 1,072 passengers. Rates—Hops, \$5 (10 min.); trips, 40 cents per mile.

W. W. MEYER, 4945 N. St. Louis Ave. 30,000 miles. 3,123 passengers. Rates—Hops, \$3 and \$5; trips, 50 cents per mile.
SIEVERT AIRCRAFT CORP., 5934 S. Cicero Ave. Two planes. 27,000 miles. 1,400 passengers. Rates—Hops, \$5; trips, 50 cents per mile.

WALTER W. WOLF, 7625 Cottage Grove Ave. One plane. 9,000 miles. 60 passengers. Rates—Hops, \$5; trips, 50 cents (day); 75 cents (night) per mile.

DANVILLE

THOS. D. KETCHBAW, 2 Delaware St. One plane.
VERMILION AERIAL CLUB, 925 Gilbert St. One plane. Rates—Hops, \$1.50, \$2.50, \$5; trips, 25 cents per mile.

DECATUR

DECATUR AIRWAYS, INC., R. R. No. 3. Two planes. 40,000 miles. 1,200 passengers. Rates—Hops, \$2.50; trips, 25 cents per mile.

DOWNERS GROVE

ARTHUR C. CHESTER, 532 Giertz St. One plane. 32,640 miles. 2,109 passengers. Rates—Hops, \$3; trips, 40 cents per mile.

ELGIN

AAVANG & HELM, 151 Melrose Ave. Three planes. 24,000 miles. Rates—Hops, \$5; trips, 35 cents per mile.

RICHARD K. PECK, 45 N. Commonwealth Ave. Two planes. Rates—Hops, \$5; trips, \$25 per hour.

FOREST PARK

YACKEY AIRCRAFT CO., Checkerboard Flying Field, Chicago, Ill. Five planes.

GALENA

W. McBOYLE. One plane. 3,240 miles. 2,000 passengers. Rates—Hops, \$3; trips, 25 cents per mile.

HINKLEY

EAGLE AIRPORT SCHOOL OF AVIATION. Two planes.

LA SALLE

TRI-CITY AIRCRAFT SERVICE, 814 1st St. One plane.

LOMAX

NATIONAL AIRWAYS SYSTEM.

LYONS

ART KILLIPS, Lyons Motor Sales. One plane. 200,000 miles. 300 passengers. Rates—Hops, \$5; trips, 50 cents per mile.

MOLINE

CAMPBELL-DESCHNEPPER AIRPLANE CO., INC., 515 18th St. Three planes. 80,000 miles. 5,500 passengers. Rates—Hops, \$2.50 and \$5; trips, OX-5, 25 cents; JS, 50 cents per mile.

MOMENCE

BROWN FLYING SCHOOL. One plane. 9,500 miles. Rates—Hops, \$3 or \$5.

MONMOUTH

MIDWEST AIRWAYS CORPORATION, Two planes. 39,000 miles. Rates—Hops, \$3; trips, 20 cents per mile.

MT. VERNON

EGYPTIAN AIRWAYS, 304 N. 16th St. Two planes. 10,000 miles. 1,000 passengers. Rates—Hops, \$2.50; trips, 25 cents per mile.

PEORIA

HUGH ENGELBRECHT. 5,000 miles.

QUINCY

R. W. SHROCK. Two planes. 9,000 miles. 1,000 passengers. Rates—Hops, \$1.50 up; trips, \$18 per hour.

QUINCY AIRCRAFT COMPANY. Two planes. 14,041 miles. 910 passengers. Rates—Hops, \$1.50 and \$2.50; trips, 30 cents per mile.

ROCKFORD

JERRY MARTIN, 617 Mulberry St. Two planes. Rates—Hops, \$3 (2 for \$5); trips, 25 cents per mile.

SPRINGFIELD

EARL L. SMITH, 220 N. 6th St. 20,000 miles. 1,500 passengers. Rates—Hops, \$3 and \$5; trips, 25 cents per mile each way.

SHELDON

SHELDON AIR LINE. 3,500 miles. 500 passengers. Rates—Hops, \$5; trips, 40 cents per mile.

Indiana**ANDERSON**

ORIN WELCH AIRCRAFT, Box 627. Two planes. Rates—Hops, \$2.50; trips, 25 cents per mile.

FT. WAYNE

SWEEBROCK AVIATION CO., 2515 W. Drive. Nine planes. 63,400 miles. 1,267 passengers. Rates—Hops, \$3; trips, 20-25 cents per mile.

FRANKFORT

TOT DOUGLAS, Box 214. Two planes. 2,040 miles. 165 passengers. Rates—Hops, \$2.50; trips, 10 cents per mile.

GARY

L. H. ATKINSON, 406 Washington St. One plane. About 150 passengers. Rates—Hops, \$5; trips, 30 cents per mile.

INDIANAPOLIS

GORDON LACKEY, 916 No. Illinois St. Two planes.
INDIANAPOLIS AIR SERVICE CO., 931 N. Meridian St. Five planes. Rates—Hops, \$2.50; trips, 20 cents both ways.
INDIANAPOLIS AVIATION CO., 2712 Bellefontaine St. Three planes. 20,000 miles. Rates—Hops, \$2.50; trips, 30 cents per mile.

KOKOMO

CLYDE E. SHOCKLEY, R. R. No. 10. Two planes. 18,480 miles. 1,178 passengers. Rates—Hops, \$3; trips, 1 pas. 40 cents; 2 pas. 60 cents per mile.

MUNCIE

MUNCIE AERIAL COMPANY. Four planes. 80,000 miles. Rates—Hops, \$2.50; trips, 15 cents per mile.

TERRE HAUTE

LEONARD WHEELER, JR., 1226 N. 8th St. Two planes. 25,000 miles. 3,269 passengers. Rates—Hops, \$2.50; trips, 20 cents per mile.

VINCENNES

RAY FORTNER. One plane. 5,000 miles. 500 passengers. Rates—Hops, \$3; trips, 15 cents per mile.

Iowa**AMES**

WILFORD GERBRACHT, 121½ Main St. One plane. 21,760 miles. 884 passengers. Rates—Hops, \$2.50; trips, 20 cents per mile.

BURLINGTON

BURLINGTON AIRPLANE CO., 1128 Domeland St. Three planes.
A. J. HARTMAN, 1126 Doernland St. One plane. 280,000 miles. 1,200 passengers. Rates—Hops, \$2.50; trips, 25 cents per mile each way.

CEDAR RAPIDS

HUNTER AIRPLANE COMPANY, 1545 Fourth Ave. Three planes. Rates—Hops, \$3; trips, 20 cents per mile.
SHAW AIRCRAFT CO. One plane.
PAUL B. SHAW, 828 Second Ave. One plane. 6,110 miles. Rates—Hops, \$3; trips, 20 cents per mile.

COUNCIL BLUFFS

BURNHAM & MILLER, 1631 Ave E. Two planes. 7,500 miles. 200 passengers. Rates—Hops, \$2.50; trips, 20 cents per mile.

DAVENPORT

DAVENPORT AIRPORT COMPANY, INC., P. O. Box 214. Four planes. 3,000 miles. 3,600 passengers. Rates—Hops, \$2.50 and \$5; trips, 30 cents per mile for two; 40 cents per mile for one.

DES MOINES

WALTER U. PRICER, 2000 E. 33rd St. One plane. 6,000 miles. Approx. 250 passengers. Rates—Hops, \$2.50; trips, 25 cents per mile.

MASON CITY

PIONEER FLYERS, INC. One plane. Rates—Hops, \$3; trips, 15 cents per mile one passenger; 20 cents per mile two passengers.
MASON CITY AIRWAYS, INC. One plane. 10,000 miles. 800 passengers. Rates—Hops, \$3; trips, 30 cents per mile.

MEDFORD

GREAT NORTHERN AIRWAY. Three planes. Rates—Hops, \$3; trips, 20 cents for one; 30 cents per mile for two.

NEVADA

CENTRAL IOWA AIRCRAFT COMPANY. One plane. Rates—Hops, \$3 (two for \$5); trips, 30 cents per mile; 5 cents for return; 5 cents for express.

ROCK VALLEY

JOE VAN GUST. One plane. Rates—Hops, \$3 and \$5; trips, 25 cents per mile.

SHENANDOAH

FREEBURG FLYING SERVICE, 300 E. Clarinda Ave. Two planes.

WINTHROP

DE WITT COLLINS. One plane. 10,000 miles. 200 passengers. Rates—Hops, \$2.50; trips, 20 cents per mile.

Kansas**ARKANSAS CITY**

W. H. (PETE) HILL. One plane. 15,000 miles. 1,689 passengers. Rates—Hops, \$2.50; trips, 20 cents per mile.

BAXTER SPRINGS

ARCHIE F. RODENBERGER. One plane. Rates—Hops, \$5.

CANEY

THE TRUSKETT FLYING SERVICE CORP. One plane. Rates—Hops, \$2.50; trips, 20 cents per mile.

CHANUTE

AUBREY M. BARNES, 813 N. Washington Ave. 20,000 miles. 1,800 passengers. Rates—Hops, \$1.50; trips, 25 cents per mile.

CHANUTE AERO CLUB, 805 S. Santa Fe. 1,000 passengers. Rates—Hops, \$1.50; trips, 20 cents per mile.
O. E. DUKERHOOF, 805 S. Santa Fe St. 6,000 miles. 400 passengers. Rates—Hops, \$2.50; trips, 25 cents per mile.

CULVER

GEORGE E. HALSEY. Two planes. 35,000 miles. 2,500 to 2,500 passengers. Rates—Hops, \$2.50; trips, 20 cents per mile.

GARNETT

RALPH E. HEIMER. One plane. 8,000 miles. 350 passengers. Rates—Hops, \$2.50; trips, 35 cents per mile one way.

HUTCHINSON

HUTCHINSON AIRWAYS CORP. One plane. 4,950 miles. Rates—Hops, \$2.50; trips, 20 cents per mile.

IOLA

B. T. BARBER, 303 West St. Four planes. Rates—Hops, \$2.50 single, \$3 for two; trips (quoted on trip).

LAWRENCE

ALLISON AIRPLANE CO., 928 Louisville St. Two planes.

WICHITA

A. E. MERRIAM. One plane. 10,000 miles.
TRAVEL AIR MFG. COMPANY. Rates—Hops, \$2.50; trips, 40 cents per mile.
WINSTEAD BROS., 2432 Rosenthal. Three planes. 2,800 passengers. Rates—Hops, \$2.50; trips, 40 cents per mile.

Kentucky**ASHLAND**

E. M. BURGESS. One plane.

LEXINGTON

KENTUCKY AIRWAYS, P. O. Box 252. Seven planes. 39,200 miles. 2,881 passengers. Rates—Hops, \$3; trips, 10 cents per mile per passenger.

PADUCAH

C. R. ISEMAN, P. O. Box 219. Two planes. 14,875 miles. 1,200 passengers. Rates—Hops, \$3; trips, 30 cents per mile.

Louisiana**NEW ORLEANS**

LOUISIANA AIRWAYS, INC., 1711 Pere Marquette Building. Four planes.
ST. TAMMANY GULF COAST AIRWAYS, INC., Roosevelt Hotel. One plane. Rates—Hops, \$50 per hour for ship; trips, \$50 per hour.

TALLULAH

SOUTHERN DUSTING COMPANY, INC. Five planes. 36,400 miles. Crop dusting only.

Maine**PORTLAND**

CLIFFORD STRANGE, 757 Congress St. One plane. 2,400 miles.

Massachusetts**BALTIMORE**

CHESAPEAKE AIRCRAFT CO., Headquarters Armory. Three planes. 36,200 miles. 126 passengers. Rates—Hops, \$5; trips, 50 cents per mile.

Massachusetts**ATLANTIC**

DENNISON AIRCRAFT CORP. Four planes. 50,000 miles. 2,000 passengers. Rates—Hops, \$5; trips, \$1 per round trip mile.

BOSTON

DENNISON AIRPORT CORP., Atlantic, Mass. Three planes.

EAST BOSTON

BAY STATE FLYING SERVICE. Two planes. 40,000 miles. Approx. 400 passengers. Rates—Hops, \$5; trips, \$30 per hour.
BOSTON AIRPORT CORP., P. O. Box 126. Six planes. Rates—Hops, \$5; trips, \$1 per mile.

SPRINGFIELD

MASSACHUSETTS AIRWAYS CORP., 1507 Main St. Three planes. 1,500 passengers. Rates—Hops, \$5; trips, 40 cents per mile each way.
NORTHEASTERN AIRCRAFT CORP., Three planes. 30,000 miles. 1,200 passengers. Rates—Hops, \$5; trips, 50 cents per mile.

W. SPRINGFIELD

H. R. BRINTON, 34 Maple Terrace. Two planes. 8,000 miles. About 500 passengers. Rates—Hops, \$2.50 and \$5; trips, 75 cents per mile.

Michigan**BATTLE CREEK**

DAVIS & FELIX AIRWAYS. Two planes. Rates—Hops, \$2.50; trips, 50 cents per mile.

CONCORD

DUDEK BROS. FLYING SERVICE. Two planes. 2,880 miles. 814 passengers. Rates—Hops, \$2.50; trips, 20 cents per mile.

DEARBORN

STOUT AIR LINES, INC., P. O. Box 86. Five planes. 154,084 miles. 19,840 passengers. Rates—Hops, \$5 for 15 min.; trips, 12 to 14 cents per mile.

DETROIT

MAYCOCK FLYERS, 12945 Montrose Ave. One plane. 2,100 passengers. Rates—Hops, \$3; trips, 40 cents per mile. OVERCASHIER AVIATION CO., 13095 Greely Ave. 50,000-75,000 miles. 2,000 passengers. Rates—Hops, \$3; trips, \$20 per hour.

RUSSELL J. PAULGER, 665 W. Warren Ave. Three planes. About 20,000 miles. 1,500 passengers. Rates—Hops, \$3; trips, 50 cents per mile.

MARION STERLING, Dodge Boat Works. One plane. 27,990 miles. 700 passengers. Rates—Hops, \$5; trips, 50 cents per mile.

WAYCO AIR SERVICE, INC., 15th at Warren. Four planes. 90,000 miles. About 500 passengers. Rates—Hops, \$5 over city; trips, 50 cents.

EAST LANSING

MICHIGAN AIRWAYS, INC., Box 914. Two planes. 120,000 miles. 11,200 passengers. Rates—Hops, \$2.50; trips, 12.5 cents per mile.

JACKSON

LUTHE FLYING SERVICES, INC., 302 Copper St. One plane. Rates—Hops, \$2.50 and \$5; trips, 20 cents per mile.

LANSING

A-B-C AIRLINE CORP., 214 United Building. One plane.

MENOMINEE

ALFRED O. SPORRER, 418 Stephenson Ave. 25,000 miles. 1,000 passengers. Rates—Hops, \$2.50 and \$5; trips, 30 cents per mile.

MUSKEGON

ARTHUR A. BILLINGS, 772 Terrace St. One plane. 400 passengers. Rates—Hops, \$3; trips, 20 cents per mile.

NILES

KYSOR EAGLEROCK CO. Four planes. Rates—Hops, \$2.50; trips, 20 cents per mile both ways.

NILES AIRWAYS, 609 Riverview Ave. Five planes.

OWOSSO

B. T. HAMMOND FLYING SERVICE. Three planes. 30,125 miles. 2,500 passengers. Rates—Hops, \$2.50 per passenger; trips, \$20 per hour.

YPSILANTI

KNAPP FLYING SERVICE. Four planes. Rates—Hops, \$2.50; trips, 50 cents per mile.

Minnesota**BUFFALO**

OWEN I. HAUGLAND. One plane. Rates—Hops, \$2.50; trips, 20 cents per mile.

MINNEAPOLIS

MARVIN A. NORTHROP, 730 Washington Ave. Two planes. Rates—Hops, \$3; trips, 50 cents per mile.

ROBBINSDALE

GENE S. SHANK & R. D. ELLIS. Four planes. 80,000 miles. Rates—Hops, \$2.50; trips, 25 cents per mile.

ST. PAUL

A. P. NELSON, 1372 Selby Ave. Two planes. Rates—Hops, \$3 (two for \$3); trips, 50 cents per mile.

NORTHWEST AIRWAYS. Four planes. 201,000 miles. Approx. 1,000 passengers. Rates—Hops, \$5; trips, 80 cents per mile.

Mississippi**GULFPORT**

JACK WEIDEN, Gulfport Flying Service. One plane. 347 miles. 400 passengers. Rates—Hops, \$2.50; trips, 20 cents per mile.

JACKSON

WHITTAKER FLYING SERVICE, Box 233. Two planes. Rates—Hops, 50 cents per mile round trip; trips, 15% reduction.

Missouri**ANGLUM**

CLYDE E. BRAYTON. Four planes. Rates—Hops, \$3; trips, 35 cents per mile. ROBERTSON AIRCRAFT CORP. Five planes. 363,680 miles. 2,180 passengers. Rates—Hops, \$3, \$6, \$25; trips, 50 and 75 cents per mile.

VAN HOFFMAN AIRCRAFT COMPANY. Six planes. 60,000 miles. 1,200 passengers. Rates—Hops, Ryan Brougham \$5; Ryan M-2 Hisso \$4; Eaglerocks \$3; trips, Ryan Brougham 60 cents; Ryan M-2 50 cents; Eaglerock 50 cents per mile. ST. LOUIS AIRCRAFT COMPANY. Two planes. Rates—Hops, \$3; trips, 35 cents per mile.

JOPLIN

OZARK AVIATION, INC. Two planes. Rates—Hops, \$2.50; trips, 20 and 25 cents per mile.

KANSAS CITY

BENNETT EAGLEROCK SALES CO., 223 W. 12th St. Five planes. PORTERFIELD FLYING SCHOOL, 2330 Harrison St. Rates—Hops, \$2.50; trips, 35 cents per mile.

RUSSELL J. DICK, 1859 E. 78th St. 20,000 miles. 787 passengers. Rates—Hops, \$2.50; trips, 35 cents one way; 25 cents per mile round trip.

TEX LAGRONE, 441 Knickerbocker Pl. One plane. 8,000 miles. 2,000 passengers. Rates—Hops, \$3, \$5, \$10 and upward; trips, 40 cents per mile.

LEONARD RHINER, 2649 N. Mill St. 25,000 miles. 1,200 passengers. Rates—Hops, \$2.50; trips, 25 cents per mile.

KIRKSVILLE

ROY DODSON, 512 So. Cottage Grove. Two planes. Rates—Hops, \$2.50.

LA BELLE

THOS. WEBBER. One plane. 47,000 miles. 606 passengers. Rates—Hops, \$2.50; trips, 35 cents per mile.

MACON

CHAS. L. FOWER. One plane. Rates—Hops, \$2.50; trips, 50 cents per mile.

MEMPHIS

LEE R. BRIGGS. Two to five planes.

MOBILE

BRYON HEFLIN, 444 E. Rollins. One plane. 10,000 miles. 600 passengers. Rates—Hops, \$3.50; trips, 25 cents per mile.

MARSHALL

MARSHALL FLYING SCHOOL, INC. Eleven planes. 700 passengers. Rates—Hops, \$2.50.

ST. LOUIS

DONALDSON AIRCRAFT CO. One plane. About 15,000 miles. Rates—30 cents per mile; minimum charge \$3.

PARKS AIR LINES, INC., 210 Missouri Bldg. Five planes. 59,000 miles. 3,391 passengers. Rates—Hops, \$3; trips, 20 cents per mile for one passenger; 15 cents per mile each for more than one.

Montana**BILLINGS**

NATIONAL PARKS SCENIC AIRWAYS, care Westover Garage. Two planes. 35,000 miles. 600 passengers. Rates—Hops, \$2.50 and \$5; trips, 35 and 40 cents one way for two.

DILLON

MONTANA AIR SERVICE CO. One plane. 50,000 miles. 200 passengers. Rates—Hops, \$5; trips, 25 cents per mile.

GREAT FALLS

VANCE AIR SERVICE. Four planes. Rates—Hops, \$2.50 and \$5; trips, 25 cents in Wacos; 20 cents in Stinson.

SIDNEY

W. M. COMBES. One plane. 7,000 miles. 600 passengers. Rates—Hops, \$2.50 each, \$5 per trip; trips, 25 cents per mile.

Nebraska**CHAPPELL**

H. A. TALBOT, One plane.

HOLDREGE

F. A. BREWSTER, M.D. Three planes. 50 passengers. Rates—Hops, \$2.50.

LINCOLN

LINCOLN AIRCRAFT COMPANY. One plane.

NORTH PLATTE

O. R. RICKEL, 723 W. 6th St. 6,375 miles. 442 passengers. Rates—Hops, \$2.50.

NEBRASKA TRAVEL AIR SALES CO. Two planes. 1,200 passengers. Rates—Hops, \$2.50; trips, 25 cents per mile.

WISNER

ANDREW A. RISSER. One plane. 3,200 miles. 2,500 passengers. Rates—Hops, \$2.50; trips, 20 cents per mile.

New Hampshire**CONCORD**

ROBERT S. FOGG. Three planes. 91,100 miles. 1,466 passengers. Rates—Hops, \$5; trips, 50 cents per mile.

New Jersey**ATLANTIC CITY**

CURTISS AIR STATION, INC. Two planes. 66,000 miles. 5,600 passengers. Rates—Hops, \$5 and \$10 each; trips, \$1 per mile.

NEW BRUNSWICK

THE MILLER CORPORATION. Two planes. 12,000 miles. Approx. 500 passengers. Rates—Hops, \$3 for 5 min; \$5 for 10 min; trips, \$30 per hour.

REYNOLDS AIRWAYS, INC., Hadley Airport. Six planes. Rates—Hops, \$3; trips, varies with machine.

PATERSON

WRIGHT AERONAUTICAL CORP. Two planes. 20,000 miles. Approx. 50 passengers.

BED BANK

JOHN F. CASEY. Three planes. 15,000 miles. 800 passengers. Rates—Hops, \$5; trips, 50 cents per mile.

New Mexico**SANTA FE**

OLAF S. EMBLEM. One plane. 14,000 miles. 150 passengers. Rates—Hops, \$5; trips, no set rate.

New York**ARMONK**

ZASSETT AIRWAYS, INC. Two planes. 21,500 miles. Rates—Hops, \$5; trips, 50 cents per mile.

BROOKLYN

HOWARD S. BEHR, 1911 Ave. L. One plane. Rates—Hops, \$5.

BUFFALO

BECKER FLYING SERVICE, INC., 250 Franklin St. Three planes. 16,000 miles. 3,800 passengers. Rates—Hops, \$3.50-\$5; trips, 15 cents per mile.

EARL H. CLARK, 534 Hewitt Ave. One plane.

DOLGEVILLE

LENDOL F. SLITER, 122 S. Main St. One plane. 5,000 miles. 40 passengers. Rates—Hops, \$5; trips, 25 and 30 cents per mile.

ELMIRA

ELMIRA AEROPLANE EXHIBITORS CORP., 823 W. Ind. St. Two planes. 20,000 miles. 1,600 passengers. Rates—Hops, \$5; trips, 50 cents or less per mile.

FLUSHING

FRANK HARRIS, Sr., 5 Delaware Ave.
Two planes. 20,000 miles. 1,500 pas-
sengers. Rates—Hops, \$5; trips, 50 cents
per mile.

GARDEN CITY

CURTISS FLYING SERVICE, INC.
Four planes. 333,520 miles. 10,106 pas-
sengers. Rates—Hops, \$5; trips, 50 cents
per passenger per mile; 10 cents for each
additional passenger.

CHARLES PROHINSIE, INC. Four
planes. Rates—Hops, \$5; trips, \$1 per
mile.

ROGERS' AIR LINES, INC. Five
planes. 251,400 miles. 25,000 passengers.
Rates—Hops, \$5; trips, 50 cents per mile.

HAMMONDSPORT

AERIAL SERVICE CORPORATION.
Three planes. 7,286 miles. 200 pas-
sengers. Rates—Hops, \$5; trips, 75 cents;
round trip, 50 cents per mile.

ITHACA

THOMAS-MORSE AIRCRAFT CORP.
Two planes. Approx. 100 passengers.
Rates—Trips, \$50 per hour.

JAMESVILLE

ERNEST B. HANNAM. One plane.
MURRAY O. HINE. One plane. 800
miles. 10 passengers. Rates—Hops, \$5.

MINEOLA

GEO. A. WIES, INC., 12 Juniper Ave.
Four planes. 37,000 miles. 650 pas-
sengers. Rates—Trips, 50 cents per mile.

NEW ROCHELLE

ATLANTIC AIRWAYS, INC. Two
planes. 30,000 miles. 1,500 passengers.
Rates—Hops, \$5; trips, \$35 to \$40 per
hour.

NEW YORK

FAIRCHILD FLYING CORP., 270 W.
38th St. Four planes. 41,500 miles.
11,188 passengers. Rates—Hops, \$5;
trips, \$1 round trip.

REYNOLDS AIRWAYS, INC., 420 Lex-
ington Ave. Six planes.

PITTSFORD

W. M. BRIZEE. One plane. 45,000
miles. 1,500 passengers. Rates—Hops,
\$3 and \$5; trips, \$60 per hour.

POR T WASHINGTON

CURTISS METROPOLITAN AIR-
PLANE CO. One plane.

RICHMOND HILL

ASSOCIATED AERONAUTICAL
CORP., 10930 122nd St. 60,000 miles.
3,500 passengers. Rates—Hops, \$5;
trips, 50 cents a mile.

ROCHESTER

NEW YORK AND WESTERN AIR-
LINES, INC., 542 Granite Building. One
plane.

SCHENECTADY

CONRAD C. BLOM, 1561 Randolph
Road. One plane. 6,000 miles. 80 pas-
sengers. Rates—Hops, \$5 for 20 min.;
trips, 20 cents per mile over 50 miles.
V. A. RICKARD, Schenectady Airport.
Two planes. 8,450 miles. 1,590 pas-
sengers. Rates—Hops, \$5; trips, between
40 and 50 cents per mile.

STATEN ISLAND

RICHMOND AIRWAYS, INC., No. 1
Annadale Road. Three planes. 11,270
miles. 1,640 passengers. Rates—Hops,
\$5 per flight; trips, seaplane rate \$70;
plane \$35 per hour.

SYRACUSE

SIMON P. BITTNER, 306 Madison St.
One plane. 12,000 miles. 1,000 pas-
sengers. Rates—Hops, \$3; trips, 20 cents
per mile.

HERBERT E. LUTHER, 530 O. C. S.
Bank Bldg. One plane. 30,000 miles.
3,000 passengers. Rates—Hops, \$3 and
\$5; trips, 30 cents per mile.

WASHINGTONVILLE

HALLOCK-JESSUP FLYING SERV-
ICE. One plane. 9,000 miles. Rates—
Hops, \$5; trips, 20 cents per mile.

WESTBURY

HENRY NATTERER. Two planes.
4,410 miles. 350 passengers. Rates—
Hops, \$5; trips, 50 cents per mile.

WHITE PLAINS

WESTCHESTER AERIAL DISPATCH,
INC., 78 Central Ave. Two planes.
25,000 miles. 750 passengers. Rates—
Hops, \$5; trips, \$25 per hour and up-
wards.

North Carolina**ASHEVILLE**

STORMS AVIATION CO., 20 N. Spruce
St. One plane. Rates—Hops, \$3 and \$5;
trips, 50 cents per mile.

CHARLOTTE

FRANK ROBINSON, 11 Grove St. 1,000
miles. 150 passengers.

GREENSBORO

PITCAIRN AVIATION OF NORTH
CAROLINA, INC. Three planes.

MONROE

UNITED AIRWAYS OF N. C. Three
planes. Rates—Hops, \$2.50; trips, \$37.50
per hour.

PINEHURST

LLOYD O. YOST. Three planes. 28,000
miles. 1,200 passengers. Rates—Hops,
\$2.50; trips, 50 cents per mile.

RALEIGH

H. B. POINDEXTER, Wilmont Apt.
House. Two planes. Rates—Hops, \$3;
trips, \$25 per hour.

North Dakota

BISMARCK

N. W. AIRCRAFT CO., Box 194. Three planes. 6,000 miles. 750 passengers. Rates—Hops, \$3 and \$5; trips, 10 to 20 cents per mile.

FARGO

E. M. CANFIELD, 25 Ninth St. Two planes. 10,750 miles. 720 passengers. Rates—Hops, \$3; trips, 25 cents per mile.

SELFIDGE

J. S. SAGMILLER, Selfridge Aircraft Co. One plane. 40,000 miles. 740 passengers. Rates—Hops, \$3 and \$5; trips, 20 cents per mile.

TOWNER

J. J. BERTRAM. One plane. 6,500 miles. 300 passengers. Rates—Hops, \$3; trips, 25 cents per mile.

Ohio

AKRON

B. E. FULTON, Box 396, R. No. 3. Two planes. 50,000 miles. 2,500 passengers. Rates—Hops, \$2.50; trips, 35 cents per mile.
THE ROBBINS FLYING SERVICE, Box 247. Three planes. 30,665 miles. 1,212 passengers. Rates—Hops, \$3 for 5 min.; \$5 for 15 min.; trips, 60 cents for one; 10 cents extra for two.

CANAL WINCHESTER

F. K. CHERRY. One plane. 4,000 miles. 200 passengers. Rates—Hops, \$3-\$5; trips, 50 cents per mile.

CANTON

CANTON AERO TRANSPORTATION CO., 1910 Mahoning Road. Three planes. 21,000 miles. 700 passengers. Rates—Hops, \$2.50 and \$5; trips, 30 cents per mile.

CHILLICOTHE

GOLDSBERRY AIRPLANE SERVICE. Two planes. 26,700 miles. 1,560 passengers. Rates—Hops, \$3 and \$5.

CINCINNATI

EMBRY-RIDDLE CO., Lunken Airport. Seven planes.

CLEVELAND

CLEVELAND PNEUMATIC AERO CO., 3734 East 78th St. One plane. 16,800 miles. 212 passengers. Rates—Hops, \$5; trips, 50 cents per mile.
YVON MILRE, INC., 1097 Union Trust Bldg. Two planes. Approx. 30 passengers. Rates—Hops, \$5; trips, 15 cents per mile.
THOMPSON AERONAUTICAL CORP., Cleveland Airport. Five planes. 1,000 passengers. Rates—Hops, \$3 and \$5; trips, 30, 40 and 50 cents per mile.
THE WILLARD PARKER FLYERS, 2400 Euclid Ave. Four planes. 24,000 miles. 2,500 passengers.

COLUMBUS

COLUMBUS FLYING SERVICE, Norton Field. One plane. 37,000 miles. 1,375 passengers. Rates—Hops, \$3 and \$5; trips, 30 cents per mile.

DAYTON

JOHNSON FLYING SERVICE, INC., 900 S. Ludlow St. 35,779 miles. 4,852 passengers. Rates—Hops, \$3; trips, 50 cents per mile.
REINHART-WHELAN CO. Four planes.

LORAIN

LONGS AIRCRAFT SERVICE—Aviation School. Four planes.

MADEIRA

FRANK BROGAN, P. O. Box 293. One plane. 3,000 miles. 35 passengers.

MARIETTA

MATTHEWS AVIATION CO., 317 Second St. Three planes. 15,000 miles. 1,000 passengers. Rates—Hops, \$2.50; trips, 50 cents per mile.
L. H. SCOTT, 328 Second St. Two planes. 50,000 miles. 3,200 passengers. Rates—Hops, \$2.50; trips, 25 cents per mile.

MASSILLON

MASSILLON AERO CORP., Mail-Hill Bldg. One plane. 30,000 miles. 1,400 passengers. Rates—Hops, \$3; trips, 50 cents per mile.

SPRINGFIELD

W. B. LITTLE, 137 N. Wittenberg Ave. Three planes. 12,000 miles. 1,230 passengers. Rates—Hops, \$2.50; trips, 50 cents per mile.

TOLEDO

STANDARD AIRCRAFT CO., INC., Box 85, Station A. Five planes.

WARREN

ERNEST C. HALL. One plane. 7,500 miles. 500 passengers. Rates—Hops, \$5; trips, 50 cents per mile.

YOUNGSTOWN

WATSON AIRPORT FLYING SERVICE, R. D. No. 1. Two planes. 12,000 miles. 178 passengers. Rates—Hops, \$3 and \$5.

Oklahoma

DUNCAN

RAINS & DONOVAN, 707 Beech Ave. One plane. 15,000 miles. 2,000 passengers. Rates—Hops, \$2.50; trips, 20 cents per mile.

OKLAHOMA CITY

SOUTHWEST AIRWAYS CORP., Route 5. Four planes. Rates—Hops, \$2.50-\$5; trips, 35 to 50 cents per mile.
TUBES FLYING SCHOOL, Route 5. Four planes. 23,650 miles. 386 passengers. Rates—Hops, \$2.50; trips, 25 cents per mile.
WILLIAM P. QUILLIN, 1307 S. Agnew. One plane. 2,100 miles. 250 passengers. Rates—Hops, \$2.50; trips, 25 cents per mile.

OKMULGEE

WILLIAM A. BURKE, Box 924. One plane. 33,000 miles. Rates—Hops, \$5; trips, 25 cents per mile.

TULSA

D. A. MCINTYRE, Box 1525. Three planes. Rates—Hops, \$5; trips, Waco 30 cents; Stinson 45 cents per mile.

Oregon**PORTLAND**

RANKIN FLYING SERVICE, INC., Four planes. 65,625 miles. 303 passengers. Rates—Hops, 25 cents a mile; trips, 25 cents a mile.

SALEM

TRASK, BODEKER & PAYNE. Three planes. 3,500 miles. 100 passengers. Rates—Hops, \$2.50; trips, 20 cents per mile.

Pennsylvania**ALTOONA**

ALTOONA AIRCRAFT CORP. Four planes. Rates—Hops, \$5; trips, 20 cents per mile.

BRADFORD

W. H. EMERY, Jr. One plane. 21,000 miles. 400 passengers. Rates—Hops, \$5; trips, 25 cents per mile.

BRIDGEVILLE

MAYER AIRCRAFT CORPORATION. Five planes. 4,000 passengers. Rates—Hops, \$3 to \$7.50; trips, 35 cents per mile.

CONYNGHAM

LLOYD O. YOST. Four planes. 30,000 miles. 1,500 passengers. Rates—Hops, \$2.50; trips, 50 cents per mile.

ESSINGTON

FRANK MILLS, P. O. Box 145. One plane.

GETTYSBURG

GETTYSBURG FLYING SERVICE, INC., Hoffman Hotel. Two planes. 2,000 passengers. Rates—Hops, \$3.

LANCASTER

LANCASTER AIRWAYS, INC. Four planes. 25,600 miles. 2,817 passengers. Rates—Hops, \$3; trips, 40 cents per mile.

LATROBE

C. B. CARROLL. Four planes. Approx. 2,300 passengers. Rates—Hops, \$3 and \$5.

LEMOYNE

J. E. STEINHAEUER. One plane. 3,635 miles. 571 passengers. Rates—Hops, \$3; trips, 35 cents per mile.

MEADVILLE

FRANK J. PAPPAS, 941 Market St. One plane.

MIDDLETOWN

FRED NELSON. One plane. 17,178 miles. Rates—Hops, \$3; trips, 50 cents per mile.

MIFFLINTOWN

HERMAN ALEXANDER. One plane. 8,420 miles. 800 passengers. Rates—Hops, \$3; trips, 25 cents per mile.

NORRISTOWN

PHILA. AIR TRANSPORT CO., Box 77. Three planes. Rates—Hops, \$3; trips, 25 cents per mile.

PARKESBURG

UNIVERSAL AIR SERVICE. Two planes. 9,280 miles. 666 passengers. Rates—Hops, \$5 per mile.

PHILADELPHIA

AMERICAN AIRWAYS, INC., Roosevelt Blvd and Cottman St. Three planes. Approx. 4,000 miles. Approx. 400 passengers. Rates—Hops, \$3 and \$5; trips, \$30 per hour.

CRESCENT AIR SERVICE. Three planes. Rates—Hops, \$3 and \$5.

STARLIGHTERS, INC., Philadelphia Municipal Airport. Eight planes. Rates—Hops, \$5; trips, 50 to 70 cents per mile.

PINE GROVE MILLS

CENTER COUNTY AERO CO., West Main St. Three planes.

PLEASANT GAP

HENRY T. NOLL. One plane. Rates—Hops, \$3.

POTTSTOWN

J. P. JONES, P. O. Box 216. Two planes.

PUNXSUTAWNEY

PENNSYLVANIA AERO SERVICE. 1,736 passengers. Rates—Hops, \$3 up; trips, 40 cents per mile.

REPUBLIC

REDSTONE FLYING PARK, INC. Box 85. Two planes. 45,000 miles. 2,200 passengers. Rates—Hops, \$3-\$5; trips, 25 cents per mile.

SOUTH PHILADELPHIA

LUDINGTON PHILADELPHIA FLYING SERVICE, INC., Paschal P. O. Four planes. 46,400 miles. 2,563 passengers. Rates—Hops, \$3.50; trips, 50 cents per mile.

WILLOW GROVE

PITCAIRN AVIATION OF PENNA., INC. Four planes. 16,051 passengers. Rates—Hops, \$3 and \$5; trips, 50 cents per mile.

YORK

KARL ORT. One plane. 20,000 miles. 1,500 passengers. Rates—Hops, \$3. YORK AIRWAYS, 527-31 E. Prospect St. Three planes. 800 passengers. Rates—Hops, \$3 and \$5; trips, 50 cents per mile.

Rhode Island**PROVIDENCE**

PAUL A. WILCOX. One plane. 1,200 miles. 24 passengers. Rates—Hops, \$5; trips, 50 cents per mile.

South Carolina

CHERAW

THOMASON-MOORE AIRWAYS, INC.
Two planes. 1,000 passengers. Rates—
\$2.50; trips, 50 cents per mile.

SPARTANBURG

ERRETT WILLIAMS. Two planes. 40,000 miles. 7,560 passengers. Rates—Hops, \$2.50; trips, 35 cents per mile.
PITCAIRN AVIATION OF SOUTH CAROLINA, INC. Two planes.

South Dakota

ABERDEEN

OLE FAHLIN. Two planes. 40,000 miles. 2,000 passengers. Rates—Hops, \$3.50; trips, 25 cents per mile.

FERNEY

C. J. WAGE. One plane. 5,000 miles. 156 passengers. Rates—Hops, \$3.50 to \$5.

RAPID CITY

RAPID AIR LINES, INC. Six planes. Approx. 85,000 miles. Approx. 5,000 passengers. Rates—Hops, \$3.50; trips, 25 cents per mile.

SIOUX FALLS

H. W. TENNANT, 715 So. Dakota Ave. Four planes.

SPEARFISH

E. C. CURRAN. One plane. 500 miles. 10 passengers. Rates—Hops, \$3.50; trips, 25 cents per mile.

Tennessee

KNOXVILLE

KNOXVILLE AERO CORP., 110 E. Vine Ave. Three planes.

MEMPHIS

MID-SOUTH AIRWAYS, INC., Box 3055, Crosstown Sta. Four planes. Approx. 60,000 miles. 2,000 passengers. Rates—Hops, \$2.50; trips, 40 cents per mile.

MEMPHIS AEROPORT CO., 83 South Third St. Four planes.

TRI-STATE AIRWAYS, INC. Four planes. 925,000 miles. 4,800 passengers. Rates—Hops, \$2.50 and \$5; trips, 25 cents per mile.

Texas

ABILENE

WEST TEXAS AIR TRANSP., INC., 313 Alexander Bldg. Three planes. 35,000 miles. Rates—Hops, \$3; trips, 1 pass. 40 cents; two—50 cents per mile.

ALBANY

9,000 miles. 16 passengers. Rates—Hops, \$3; trips, 25 cents per mile.
A. M. BRACKETT, Box 397. One plane.

AUSTIN

S. W. RUFF, University Airport. Nine planes. Rates—Hops, \$2.50 to \$5; trips, 35 to 50 cents per mile.

BELLAIRE

ROY ROSENBERGER. One plane. 1,500 miles. 100 passengers. Rates—Hops, \$3 for 5 min.; trips, 16 cents per mile.

BROWNSVILLE

BORDER AIRWAYS. Two planes. Rates—Hops, \$2.50; trips, 20 to 30 cents per mile.

CORNICANA

CHAS. F. PEDLEY. One plane. 41,000 miles. Rates—Hops, 35 cents; trips, 25 cents per mile.

DALLAS

GOOD & FOSTER, Love Field. Three planes. 20,350 miles. 245 passengers. Rates—Trips, 25 cents per mile.

D. HAMILTON, Prathie Cadillac Co. Two planes. 5,225 miles. 300 passengers. Rates—Hops, \$2.50; trips, 35 cents per mile.

A. D. NIEMEYER, 102 N. Ervay St. One plane. 8,400 miles. 310 passengers. Rates—Hops, \$1.50 up; trips, 35 cents per mile.

FORT WORTH

SLADE S. BILL, JR., 2800 S. Adams. One plane. Rates—Hops, \$2.50 per head; trips, 40 cents per mile.

REG. ROBBINS. One plane. 2,000 passengers. 10,000 miles. Rates—Hops, \$2.50; trips, 40 cents per mile.

HENRY WOODS, Municipal Airport. One plane.

HOUSTON

LA PIERRE CAVENDER, 3819 Main. One plane. 525,000 miles. 6,000 passengers. Rates—Hops, \$3 down; trips, 30 cents per mile.

HOUSTON AIRWAYS, INC., Municipal Airport. Two planes. 30,000 miles. 1,500 passengers. Rates—Hops, \$2.50; trips, 50 cents per mile.

QUICK AEROPLANE DUSTING, INC., 1014 Fannin St. Six planes. Crop dusting only.

RAYMOND PEARSON AERO CO. One plane. 15,000 miles. 500 passengers. Rates—Hops, \$3—2 for \$5; trips, 25 cents per mile.

TIPS & SMITH, INC., 1222 Sumner St., P. O. Box 153. Four planes. 31,800 miles. Crop dusting only.

LONE OAK

TONCRAY MOTOR & AIRPLANE CO. Two planes. 15,000 miles. 150 passengers. Rates—Hops, \$2.50; trips, contract.

NACOGDOCHES

JOHN W. CATER. One plane. 10 passengers. Rates—Hops, \$2.50.

SAN ANTONIO

W. C. MAUS, Route 1, Box 101. Three planes. 23,000 miles. 1,500 passengers. Rates—Hops, \$3; trips, 20 cents per mile.

SOUTHERN AIRWAYS, INC. Three planes. Rates—Hops, 25 cents; trips, 17½ cents per mile.

Utah

SALT LAKE CITY

A. R. THOMPSON. Two planes. 56,800 miles. 4,800 passengers. Rates—Hops, \$2.50; trips, 25 cents per mile.

Vermont

NEWPORT

VERMONT AIRWAYS CORP., 67 Main St. Four planes. Rates—Hops, \$5; trips, 25 cents per mile.

Virginia

ALEXANDRIA

MT. VERNON AIRWAYS, INC. Four planes. 40,000 miles. 4,000 passengers. Rates—Hops, \$3; trips, 35 cents per mile.

FORT LEE

PITCAIRN AVIATION OF VIRGINIA, INC., c/o Richard E. Byrd Flying Field. Two planes. Rates—Hops, \$3 and \$5; trips, 50 cents per mile.

RICHMOND

CHARLES FLYING SERVICE, Box 44, Northside. Two planes. 54,000 miles. Rates—Hops, \$2.50; trips, 30 cents per mile.

R. T. FLYING SERVICE, INC. Three planes. 40,000 miles. 3,472 passengers. Rates—Hops, \$3 and \$5; trips, 30 cents—3-place plane, \$3 for 10-place.

SOUTH WASHINGTON

POTOMAC FLYING SERVICE, INC. Four planes. 20,000 passengers. Rates—Hops, \$3; trips, 40 to 65 cents per mile.

Washington

ABERDEEN

HOWARD F. MAISH, Broadway Apts. Four planes. 1,500 miles. About 600 passengers. Rates—Hops, \$2.50 and \$5; trips, 25 cents—1 person; 5 cents each additional passenger per mile.

EAST SEATTLE

A. C. ECKMANN, 4239 Tenth N. One plane. 2,000 miles. 150 passengers. Rates—Hops, \$5.

SEATTLE

THE AVIATION SCHOOL, INC., P. O. Box 765. One plane. Rates—Hops, \$2.50 each; trips, 25 cents per mile.

PHILLIPS FROBERG FLYING SCHOOL, P. O. Box 765. 18,750 miles. 1,200 passengers. Rates—Hops, \$2.50; trips, 25 cents per mile.

SEATTLE FLYING SERVICE, INC., 5600 West Marginal Way. Two planes. Rates—Hops, \$25 per hr.; trips, \$20 per hour.

SPOKANE

MAMER FLYING SERVICE, INC., 1104 Paulsen Bldg. Three planes. 64,000 miles. 1,000 passengers. Rates—Hops, \$5; trips, 35 cents per mile.

TACOMA

R. N. BERGEN, Hotel Winthrop. Three planes. Rates—Hops, \$5; trips, \$30 per hour.

OLYMPIC AERONAUTICAL CORP., 710 Washington Bldg. Four planes. 30,000 miles. 2,200 passengers. Rates—Hops, \$2.50 and \$5; trips, 20 cents per mile.

West Virginia

HUNTINGTON

W. O. DAVIS, 826 Sixth Ave. One plane.

WHEELING

JACK R. ADAMS, Box 747. One plane. 3,571 passengers. Rates—Hops, \$3 single; \$5 double; trips, 50 cents per mile.

Wisconsin

KENOSHA

HART G. SMITH, 1512 61st St. Two planes. 20,000 miles. 3,500 passengers. Rates—Hops, \$3.

KOHLER

ANTON F. BROTZ, 116 Grafton Ct. One plane. 1,150 miles.

MADISON

ROYAL AIRWAYS CORP., 116 E. Washington Ave. Four planes.

MILWAUKEE

FRANCHE AIRCRAFT CO., 786 Indiana Ave. 6,480 miles. 57 passengers. Rates—Hops, \$5.

MIDWEST AIRWAYS, INC., Sta. D, Route 1. Two planes. 12,000 mil.s. 643 passengers. Rates—Hops, \$5; trips, variable.

WILLIAM C. WILLIAMS, 891½ Third St. Two planes. 20,000 miles. 400 passengers. Rates—Hops, \$5; trips, 50 cents per mile.

PRAIRIE DU SAC

EDWIN C. ACCOLA. One plane. 10,000 miles. 450 passengers. Rates—Hops, \$2.50; trips, 20 cents per mile.

SUPERIOR

A. J. HASE, Arrowhead Airways Co. Two planes. Rates—Hops, \$3; trips, 35 cents per mile.

WAUSAU

NORTHERN AIRWAYS, INC. Three planes. 50,000 miles. Rates—Hops, \$5; trips, 40 to 50 cents per mile.

Wyoming

CASPER

WYOMING AIRWAYS CORP., c/o Corker Binch Co., 132 No. Wolcott St. Two planes.

KAYCEE

EYCHANER BROS. One plane. 3,000 miles. About 200 passengers. Rates—Hops, \$2.50; trips, 25 cents per mile.

FLYING CLUBS

Alabama

Birmingham Flying Club.

Arkansas

Little Rock Chapter of N. A. A.
Pine Bluff Chapter of N. A. A.

California

Southern California Chapter of N. A. A.
San Francisco Chapter of N. A. A.
San Diego Chapter of N. A. A.
El Dorado Chapter of N. A. A.
Coalinga Chapter of N. A. A.
Woodland—Yolo Fliers Club.
Kern County Chapter of N. A. A.
Brea Air Club.

Colorado

Denver Chapter of N. A. A.

Connecticut

New Haven Chapter of N. A. A.
New Haven—Yale Aeronautical Association.
Waterbury Light Plane Club.

District of Columbia

Washington Chapter of N. A. A.

Florida

Miami Chapter of N. A. A.
Jacksonville Chapter of N. A. A.
Jacksonville—Aeronautic Society of Florida.

Georgia

Atlanta Chapter of N. A. A.

Illinois

Chicago Chapter of N. A. A.
Chicago—Model Aero Club.
Chicago—Aviation Club of Chicago.
Peoria—Aircraft Club of Peoria.
Alton Aeronautical Club.

Indiana

Fort Wayne Chapter of N. A. A.

Iowa

Des Moines Chapter of N. A. A.
Davenport Chapter of N. A. A.

Kansas

Kansas City Chapter of N. A. A.
Wichita Chapter of N. A. A.
Wichita Flying Club.
Wichita—Mississippi Valley Aviation Clubs Association.
Topeka Aero Club.

Kentucky

Louisville—Aero Club of Kentucky Chapter of N. A. A.
Lexington Aero Club.

Louisiana

New Orleans Chapter of N. A. A.
New Orleans—Aero Club of Louisiana.

Maine

Bangor Chapter of N. A. A.
Augusta—State of Maine Chapter of N. A. A.
Portland Chapter of N. A. A.

Maryland

Cumberland Chapter of N. A. A.
Baltimore—The Flying Club of Baltimore.

Massachusetts

Boston Chapter of N. A. A.
Pittsfield Aero Club.
Worcester—Aero Club of Worcester.
Cambridge—Aeronautical Engineering Society.

Michigan

Battle Creek Chapter of N. A. A.
Saginaw Chapter of N. A. A.
Detroit Flying Club Chapter of N. A. A.
Detroit—Aero Club of Michigan.
Detroit—Air Service Veterans' Club.
Detroit—Aviation Country Club.
Grand Rapids Aero Club.
Ypsilanti—Huron Valley Flying Club.

Minnesota

Duluth—Head of the Lakes Aero Club.

Missouri

St. Louis Chapter of N. A. A.
Kansas City Chapter of N. A. A.
St. Joseph Chapter of N. A. A.
Anglum—Flying Club of St. Louis.
St. Louis—Missouri Aeronautical Society.

Montana

Helena—Aero Club of Mount St. Charles College.

Nebraska

Omaha Chapter of N. A. A.
Omaha—Aero Club of Omaha.

New Jersey

Camden Chapter of N. A. A.
Paterson Chapter of N. A. A.
Camden—South Jersey Aviation Club.
Atlantic City Aero Club.
Air Mail Pilots of America.
Wright Aeronautical Chapter of N. A. A.

New York

Peekskill Chapter of N. A. A.
New York Chapter of N. A. A.
Long Island City Chapter of N. A. A.
Schenectady Chapter of N. A. A.
Albany Chapter of N. A. A.
Rochester—Rochester Aero Club.
Buffalo—Buffalo Aero Science Club.
Rochester Flying Club.
White Plains—Aero Club of the Y. M. C. A.
Buffalo—Aero Club.
Buffalo—Aeronautical Research Club.

Ohio

Youngstown Chapter of N. A. A.
Cleveland Chapter of N. A. A.
Cincinnati Chapter of N. A. A.
Canton Chapter of N. A. A.
Akron (Woman's) Chapter of N. A. A.
Dayton University Chapter of N. A. A.
Dayton Chapter of N. A. A.
Akron (Men's) Chapter of N. A. A.
Columbus—Aero Club of Columbus.
Cleveland Aviation Club.
Cleveland Aero Club.
Cincinnati—Queen City Aero Club.
Dayton Aero Club.

Oklahoma

Tulsa Chapter of N. A. A.

Oregon

Portland—Aero Club of Oregon.

Pennsylvania

Philadelphia Chapter of N. A. A.
McKeesport Chapter of N. A. A.
Philadelphia—Aero Club of Pennsylvania.
Lancaster Aero Club.
Philadelphia Aeronautical Recreation Society.
Altoona—Aero Club.
Erie—Aero Club.

South Carolina

Charleston Chapter of N. A. A.

Tennessee

Aero Club of Memphis.
Nashville—Aeronautical Corp.

Texas

Houston Chapter of N. A. A.
Dallas Chapter of N. A. A.

Virginia

Norfolk Chapter of N. A. A.

Washington

Seattle Chapter of N. A. A.
Seattle—Pacific Northwest Model Aero Club.

West Virginia

Wheeling Chapter of N. A. A.
Moundsville Chapter of N. A. A.

Wisconsin

Milwaukee Chapter of N. A. A.
Madison Chapter of N. A. A.
Milwaukee—Badger Aeronautical Association.

Wyoming

Casper—Powder River Flying Club.

Foreign Chapters, N. A. A.

Honolulu, T. H., Chapter of N. A. A.
Paris Chapter of N. A. A.

District of Columbia

Washington, D. C.—National Aeronautical Association.
Washington, D. C.—Aero Club of Washington.

FOREIGN AERONAUTICAL OFFICIALS

The following list of aeronautical bureaus and officials of foreign countries has been compiled from best available sources:

ARGENTINA

Coronel Luis A. Cassinelli, Director del Servicio Aeronautica del Ejercito, Ministerio de Guerra, El Palomar F.C.P., Buenos Aires.
Teniente-Coronel Jorge B. Crispo, Director del Aeronautica Civil, Ministerio de Guerra, El Palomar F.C.P., Buenos Aires.

AUSTRALIA

Lieut. Col. H. C. Brinsmead, Controller of Civil Aviation, Department of Defense, Melbourne, Australia.

AUSTRIA

Ministerial Councillor Dr. Victor von Krauss, The Federal Ministry of Commerce and Transportation, Section 49, Aviation Department, Stubenring 1, Vienna.

BELGIUM

Major Dhanis, Technical Director of Military Aviation, Ministry of National Defense, 2, Rue de La Loi, Brussels.
General-Major Van Crombrugge, Chef, Administration de l'Aeronautique, Ministry des Postes et Telegraphie, Brussels.
Captain-Commandant, Crabbe sous-chef, Administration de l'Aeronautique, Ministry des Postes et Telegraphie, Brussels.

BRAZIL

General Mariante, Director da Aeronautica, Escola de Aviao Militar, Villa Militar, Rio de Janeiro.
Coronel Alvaro Octavio de Alencastre, Escola de Aviao Militar, Villa Militar, Rio de Janeiro.

Rear Admiral Alvaro Nunes de Carvalho, Commandante de Escola de Aviao, Ministerio da Marinha, Rio de Janeiro.
Capitaes de Mar e Guerre Carlos Alves de Souza, Commandante de Escola de Aviao, Ministerio da Marinha, Rio de Janeiro.

STATE OF SÃO PAULO (São Paulo Militia)

Orton Hoover, Rua Atlantica 17, São Paulo.
São Paulo State Police Air Service, Coronel Pedro Dias de Campos, Av. Tiradentes, 13, São Paulo.

BULGARIA

Director P. D. Popkristeff, Bureau of Aeronautics, Sofia.

CANADA

Group Captain J. S. Scott, Director Royal Canadian Air Force, Department of National Defence, Ottawa, Ontario.
Wing Commander J. L. Moidon, Asst. Director Air Staff and Personnel, Department of National Defence, Ottawa, Ontario.
Wing Commander E. W. Stedman, Asst. Director Supply and Research, Department of National Defence, Ottawa, Ontario.
J. A. Wilson, Asst. Director and Secretary, Department of National Defence, Ottawa, Ontario.
Flight Lt. A. T. Cowley, Controller of Civil Aviation, Department of National Defence, Ottawa, Ontario.

CHILE

Chief of Military Aviation Lt. Col. Jose E. Veloso Rivere, Inspector of Aviation, Santiago.
Chief of Naval Aviation, Luis A. Davila E., Captain de Fragata, Valparaiso.

CHINA

Naval Air Establishment, Mamoi, Foo-chow, China.
 Prazar, Federal, Inc., Mukden, China, with head office in Tientsin (large importer).

COLOMBIA

Ministerio de Guerra, Republica de Colombia, Bogota.
 Major Henri Pilichody, Jefe de Escuela Militar, Madrid, Bogota.

CUBA

Dr. Jose Antonio Montalvo, Chief of Communications, Havana.
 Military Aviation, Captain Manuel Arozarena y Reyes, Havana.
 Comandante Ovisio Ortega, Havana.
 Brig. Jose Semidey, Suarez y Diaria, Havana.

CZECHOSLOVAKIA

General L. Ccek, Chief of Aviation Department, Ministry of National Defense, ul. Narodni Orlany, Prague-Bubenec.
 Ing. Zdanko Janak, Chief of Aviation Section, Ministry of Public Works, 6 Presslova, Prague-Smichov.

DENMARK

Army: Col. J. P. Koch, Aviation Corps, Krigsministeriet, Copenhagen.
 Navy: Capt. A. E. V. Grandjean, Chief Aviation Corps, Marineministeriet, Copenhagen.
 Civil: Mr. Knud Gregersen, Trafikministeriet, Copenhagen.

ESTHONIA

Lieut.-Col. A. Steinberg is in command of the Air Force, Tallinn.

FINLAND

Pouhustusministerion Insinööri-osasto, Teknillisen Toimiston Paalikko, Korkeavyonkatu 27, Helsinki, Finland.
 Lieut.-Col. Vaino Vuori, Chief of Air Force.
 Purchases of flying equipment made by Col. Knut Solin, Chief, Engineering Department, Ministry of Defense.

FRANCE

Ingenieur General du Genie Maritime Fortant, Directeur du Service Technique de l'Aeronautique, Paris.
 General Dumesnil, Directeur de l'Aeronautique Militaire, Paris.
 Capitaine de Vaisseau, J. J. N., Laborde, Directeur de l'Aeronautique Maritime, Paris.
 Sous-Secretariat d'Etat de l'Aeronautique et des Transports Aeriens, 37, Avenue Rapp, Paris.

GREECE

General Mazarakis, Hellenic Ministry of War, Direction of Aeronautics, Athens.
 Captain Domestica, Hellenic Ministry of Marine, Direction of Aeronautics, Athens.

HUNGARY

Charles Vassel, Chief, Royal Hungarian Aerial Office, 11, Fo-u. 6, 11, Budapest.

INDIA

Air Vice-Marshal Sir E. L. Ellington, K.C.B., Royal Air Force, Imperial Secretariat, Raisina, Delhi.

ITALY

Gen. Italo Balbo, The Undersecretary of State for Aviation.

JAPAN

Lieut.-Gen. K. Yasumitsu, Kojimachi, Tokio.

LATVIA

Col. Bashko, Commander of Aviation Regiment, Riga.
 Lt. Col. Jakubov, Chief of Naval Aviation, Riga.

LITHUANIA

Captain Gustaitis, Assistant Chief of Aviation, Ministry of Defense, Kovno.

MEXICO

General Jose Luis Amezcua, Chief of Aviation, Mexican Army, Valbuena, D. F., Mexico.
 Sr. Juan Guillermo Villasana, Chief, Aviation Bureau, Department of Communications and Public Works, Mexico, D. F.

NETHERLANDS

E. Th. de Veer, Director, Air Navigation Department, Ministry of Public Works, The Hague.
 Lieut. Col. Donk, General Staff, Department of War, The Hague.
 Lieut. Col. Hardenberg, Commandant, Army Air Force, Department of War, The Hague.

NETHERLANDS INDIA

Lieutenant, 1st Cl., J. Olivier, Department of the Marine, Weltevreden, Batavia, Java.
 Captain W. Leenderts, Department Van Oorlog, Bandoeng, Java.

NEW ZEALAND

Major General R. Young, General Officer Commanding, New Zealand Air Force, Wellington, New Zealand.

NORWAY

Colonel G. Gruner, Chairman, Forsvarsdepartementets Luftfartsrad, P. O. Box 313, Oslo.

PERSIA

Colonel Ahmed Khan Nakhichevan, Chief of Aviation Bureau, Ministry of War, Teheran.

PERU

Captain H. R. Grow, Director de Hidro-aviacion, Ancón, Peru.
 Colonel Juan Leguia, Inspector General de Aeronautica, Escuela Militar de Aviacion, Las Palmas, Chorillos, Lima.
 Colonel Juan O'Connor, Jefe de la Escuela de Aviacion, Las Palmas, Chorillos, Lima.

POLAND

Ministerstwo Spraw Wojskowych, Warsaw (Military and Naval).

Witold Czapski, Department Director,
Ministerstwo Kolci, Warsaw (Com-
mercial).

PORTUGAL

General Luis Domingues, Inspector-Gen-
eral da Aeronautica Militar, Ministerio
dne Guerra, Lisbon.

RUMANIA

Dlul. General Rudeanu, Department Aeru-
nautic, Ministerul de Razboi, Bucharest.

SALVADOR

Dr. Pio Romero Bosque, Minister of War,
Marine and Aviation, Salvador.
General of Engineers Carlos Carmona,
First Chief of Aviation, Salvador.

SIAM

Purchases U. S. materials through the In-
ternational Engineering Co., 250 Park
Avenue, New York City.
(Bureau Aeronautique, Department de
Guerre, Bangkok, Siam).

SPAIN

Sr. Don Mariano de las Penas, Servicio
de Aeronautica Civil, Ministerio del
Trabajo, Industria y Comercio, Madrid.

SWEDEN

Combat Aviation: Chief of Air Service,
General K. A. B. Amundson.
Civil Aviation: Chief of Air Traffic Board,
C. J. Carlberg, Under Secretary, De-
partment of Communications, Mynttor-
get 2, Stockholm.

SWITZERLAND

Director of Civil Aviation (Office Aerion
Federal), Major al'E. M. G. A. Isler,
Department des Chemins de Fer, Bati-
ment Nord No. 52, Berne.

TURKEY

Colonel Muzzafez Bey, Department of
Military Aviation, Eski Chehir, Turk-y.

URUGUAY

Teniente Coronel Don Cesareo L. Berisso,
Director de la Escuela Militar de Avia-
cion, Camino Mondoza, Montevideo.
Captain Glauco Larre Borges, c/o Centro
Civil de Aviacon, Metilla, Montevideo.

VENEZUELA

Generale Jose Vincente Gomez, El Minis-
terio de Guerra y Marina, Caracas.

AERONAUTICAL MAGAZINES OF THE UNITED STATES

Aero Digest—220 West 42nd St., New York,
N. Y.
The Air—540 Leader Bldg., Cleveland, Ohio.
Airports—Fushing National Bank Bldg.,
Flushing, Long Island, N. Y.
Air News—San Diego, Calif.
Air Transportation (published weekly)—1265
Broadway, New York, N. Y.
Air Travel News—1500 Buhl Bldg., Detroit,
Mich.
Aviation (published weekly)—250 West 57th
St., New York, N. Y.
The Aviationist Publishing Co.—Labrosse,
at 12th St., Detroit, Mich.
Aviation Stories & Mechanics—109 West
49th St., New York, N. Y.

Flying Wings—Leon L. Booth, Ed., Shreve-
port, La.
National Aeronautics Association Review—
910 17th St. N. W., Washington, D. C.
Pacific Aviation—L. C. Smith Bldg., Seattle,
Wash.
Popular Aviation—508 S. Dearborn St.,
Chicago, Ill.
Southern Aeronautics—608 S. Poydras St.,
Dallas, Texas.
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ton, D. C.
Western Flying—Bryson Bldg., Los Angeles,
Calif.

FOREIGN AERONAUTICAL MAGAZINES

Argentina

Aviacion—Florida, 171 U. T., 33 Avenida,
6, 900, Buenos Aires. *Boletin del Aero
Club Argentina*—646, Avenida de Mayo,
Buenos Aires. Monthly.

Australia

Aircraft—Aircraft Press, Peacock House,
486-490 Bourke St., Melbourne. Monthly.

Austria

Flug—Elisabethstrasse 3, Vienna. Monthly.

Belgium

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esienne, Brussels. Monthly.

Brazil

Aerophilo—Organ of Aero Club of Brazil,
Rio de Janeiro.

Canada

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Co., Ltd., Toronto.

Czechoslovakia

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Konvitska, Prague I. Monthly. *Letec*—
8, Lucemburska, Prague-Vinohrady.
Monthly. *Zpravys Letectvi, Letnanay*—
Prague. Monthly. *Letectrif*—Vedic-
kova ul 41-IV, Prague II.

Denmark

Vesterborgade—3 Copenhagen.

England

Airways—Newton & Company, 110 Strand,
London, W. C. 2. *Air Pilot*—H. M.
Stationery Office, Adastral House,
Kingsway, London, W. C. 2. *The Aero-
plane*—175 Piccadilly, London, W. 1.
Weekly. *Flight*—36 Great Queen St.,
Kingsway, London, W. C. 2. Weekly.
Automobile Engineer—Dorset House,
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*Journal of the Royal Aeronautical So-
ciety*—7 Albemarle St., Piccadilly, Lon-

don, W. J. Monthly. *Air*—Astor House, Aldwych, London, W. C. 2. *Fighting Forces*—2 Amen Corner, London, E. C. 4.

Finland

Aero—Helsingfors. Monthly.

France

L'Indicateur Aerien—5 Rue de l'Isly, Paris. Monthly. *L'Air*—5 Rue de l'Isly, Paris. Twice a month. *Le Document Aeronautique*—40 Quai des Celestins, Paris. Monthly. *Bulletin de la Chambre Syndicate des Industries Aeronautiques*—9 Rue Anatole-de-la-Forge, Paris. *Bulletin de la Federation Aeronautique Internationale*—35 Rue Francois 1er, Paris. *L'Aeronautique*—35 Quai des Grands Augustins, Paris. Monthly. *Revue de l'Aeronautique Militaire*—55 Quai des Grands Augustins, Paris. *Etudes Aeronautiques*—282 Bld. St. Germain, Paris. Quarterly. *Official Bulletin of the International Commission for Air Navigation*—20 Avenue Kleber, Paris. *La Technique Aeronautique*—5 Rue de l'Isly, Paris. Monthly. *L'Aerophile*—35 Rue Francois 1er, Paris. Monthly. *Les Ailes*—40 Quai des Celestins, Paris. Weekly. *Bulletin de la Navigation Aerienne*—7 Rue St. Lazare, Paris. Monthly.

Germany

Nachrichten fuer Luftfahrt—Reichsverkehrministerium, Luftfahrtabteilung, Berlin. *Automobil-Flugwelt*—Breitestrasse 8-9, Berlin, C. 2. Weekly. *Luftfahrt*—Linkstrasse 38, Berlin, W. 9. Twice a month. *Zeitschrift fuer das gesamte Luftrecht*—Genthinerstrasse 38, Berlin, W. 10. Quarterly. *Flug-Woche*—Budapeststrasse, Berlin. *Zeitschrift fuer Flugtechnik und Motorluftschiffahrt*—Glueckstrasse 8, Munich. Bi-Monthly. *Der Luftweg*—Blumenshop 17, Berlin, W. 35. *Die Luftwacht*—Blumes Hof 17, Berlin, W. 35. Monthly. *Flugsport*—Bohnofplatz 8, Berlin, W. 62.

Hungary

AZ Aero—Budapest.

Italy

Reivista Aeronautica—Via Agostino Depretis, 45A, Rome. Monthly. *Notiziario Tecnico*—Via Agostino Depretis, 45A, Rome. Monthly. *Rendiconto Tecnici*—Via della Guardiola, 22, Rome. *Bollettino Aviazione Civile e Traffico Aero*—Via della Mercede, 9, Rome. Monthly. *L'Aereo Tecnico*—Via della Coppelie, 35, Rome. Monthly. *Auto-Moto-Ciclo*—Via Lauro, 2, Milan. Bi-Monthly. *L'Ala d'Italia* and *La Gazzetta dell'Aviazione*—Via Valpurga, 2, Milan. *Aeronautica*—Via Gesù, 6, Milan. Monthly. *Rassegna Marittima Aeronautica Illustrata*—Via Ulisse Sani, 5, Rome. *Il Diritto Aeronautico*—Via della Scrofa, 39, Rome. Bi-Monthly. *L'Aviazione*—Via del Tritone, 183, Rome. Weekly.

Japan

Aeronautical World—1 Hachoberi, Tokyo.

Netherlands

Hot Vliegvel—Single 464, Amsterdam. Monthly. *Aeronautica*—Koningstraat, 15, Arnhem. International Monthly.

Poland

Lotnik—Kzeczypopolitej, 9, Posen. Weekly. *Lot Polski*—Długa, 50, Warsaw. Monthly. *Młody Lotnik*—Krakowskie Przedmiescie, 5, Warsaw. Monthly.

Spain

Alas—Plaza de la Tealad, 4, Madrid. Monthly. *Aerco*—Glorieta de Atocha, 8, Madrid. Monthly. *Espana Automovil Aeronautica*—Plaza de Isabel II, 5, Madrid. Semi-Monthly.

Sweden

Flygning—Aktb. Aerotransport, Jacobsgaten, 6, Stockholm. Monthly. *Svensk Motortidning*—Nybrogatan, 3, Stockholm.

Switzerland

Schweizer Aero Revue—Sihlstrasse, 43, Zurich. Monthly.

AVIATION COMMITTEES AND AIRPORT MANAGERS

The following is a list of Chairmen of the Aviation Committees of various trades bodies and the managers of local airports:

ALABAMA

Tuscaloosa—Chamber of Commerce: Luther Maxwell, Chairman and Airport Manager.

ARIZONA

Bisbee—Chamber of Commerce: Clifford Rolfe, Chairman. Globe—Globe Luncheon Club: A. Hansen, Chairman. Phoenix—Arizona Industrial Congress: P. G. Spilsbury, Chairman. Tempe—Chamber of Commerce: T. A. Anderson, Chairman; J. A. Wellington, Airport Manager. Williams—Grand Canyon Chamber of Commerce: Geo. W. Kimball, Chairman; L. S. Williams, Airport Manager.

ARKANSAS

Fort Smith—Chamber of Commerce: Leigh Kelley, Chairman and Airport Manager. Little Rock—Chamber of Commerce: Lawrence Banks, Chairman. Pine Bluff—Chamber of Commerce: F. M. Smart, Chairman; L. Garratt, Airport Manager. Texarkana—Chamber of Commerce: F. E. Pharr, Chairman; S. C. Nancarrow, Airport Manager.

CALIFORNIA

Alameda—Chamber of Commerce: C. L. Traver, Chairman; Chadwick Thompson, Airport Manager.

Atascadero—Business Men's Assn: O. L. Willett, Chairman.
 Bakersfield—Civic Commercial Assn: Howard Nichols, Chairman; Robt. H. Martin, Airport Manager.
 Burlingame—Chamber of Commerce: Leonard E. Read, Chairman; Frank Flynn, Airport Manager.
 Calexico—Chamber of Commerce: R. Henderson, Chairman; Earl Mitchell, Airport Manager.
 Compton—Chamber of Commerce: L. F. Root, Airport Manager.
 Corning—Chamber of Commerce: W. N. Woodson, Chairman and Airport Manager.
 El Centro—Chamber of Commerce: Harold Burnham, Chairman.
 Exeter—Chamber of Commerce: J. R. Schmitt, Chairman and Airport Manager.
 Fresno—Chamber of Commerce: A. R. Kuhn, Chairman; A. M. Jensen, Airport Manager.
 Fullerton—Chamber of Commerce: Howard A. Krause, Chairman; Ray B. Leach, Airport Manager.
 Lodi—Chamber of Commerce: S. G. Kreiger, Chairman; George A. J. Acampo, Airport Manager.
 Long Beach—Chamber of Commerce: Gus. Walker, Chairman; D. D. Skinner, Airport Manager.
 Los Angeles—Chamber of Commerce: Ben R. Meyer, Chairman.
 Merced—Chamber of Commerce: Jack Graham, Chairman; Louis R. Foote, Airport Manager.
 Modesto—Chamber of Commerce: F. J. Rossi, Airport Manager.
 Ontario—Chamber of Commerce: Thos. R. Cummins, Chairman; Ralph C. Vaughn, Airport Manager.
 Palo Alto—Chamber of Commerce: C. D. Marx, Chairman; Lt. N. A. Goddard, Airport Manager.
 Petaluma—Chamber of Commerce: H. J. Beidleman, Secretary; Wm. Fletcher, Airport Manager.
 Pittsburg—Chamber of Commerce: Harry A. Barnes, Chairman; Otis Loveridge, Airport Manager.
 Pomona—Chamber of Commerce: H. B. Westgate, Chairman.
 Porterville—Chamber of Commerce: Lester Lamkin, Airport Manager.
 Redding—Chamber of Commerce: Lyle D. Sarvis, Chairman.
 Riverside—Chamber of Commerce: J. Harold Wilson, Chairman; Roman Warren, Airport Manager.
 San Diego—Chamber of Commerce: Major T. C. Macaulay, Chairman; Joseph W. Brennan, Airport Manager.
 San Jose—Chamber of Commerce: Charles L. Snyder, Chairman; R. A. Eccles, Airport Manager.
 Santa Paula—Chamber of Commerce: A. J. Thille, Chairman; Ralph Dickenson, Airport Manager.
 Stockton—Chamber of Commerce: O. E. Sandman, Chairman; Bert H. Lane, Airport Manager.
 Torrance—Chamber of Commerce: W. Rufus Page, Chairman.
 Turlock—Chamber of Commerce: Carl Tell, Chairman; Lon Foote, Airport Manager.

Watsonville—Chamber of Commerce: Dr. H. G. Watters, Chairman.

COLORADO

Colorado Springs—Chamber of Commerce: R. O. Giddings, Chairman.
 Denver—Chamber of Commerce: J. E. Loiseau, Chairman.
 Pueblo—Pueblo Commerce Club: Frank S. Hoag, Chairman.
 Sterling—Chamber of Commerce: Vern Coverdell, Chairman.

CONNECTICUT

Bridgeport—Chamber of Commerce: A. E. Lavery, Chairman; Reginald DeLacour, Airport Manager.
 Bristol—Chamber of Commerce: Judge W. J. Malone, Chairman.
 New Britain—Chamber of Commerce: Howard Parsons, Chairman.
 New Haven—Chamber of Commerce: R. B. Whittlesey, Chairman.
 South Norwalk—Board of Trade: General Russell Frost, Chairman.
 Waterbury—Chamber of Commerce: Paul A. Diederich, Chairman.

FLORIDA

Arcadia—Chamber of Commerce: H. L. Leonard, Chairman.
 Bradenton—Chamber of Commerce: Harry Land, Chairman.
 Coral Gables—Chamber of Commerce: Chas. Ehrman, Chairman; Airport Manager.
 De Land—Commercial Club: Clifford Botts, Chairman.
 Fort Myers—Chamber of Commerce: H. W. Langmead, Chairman.
 Ft. Myers—Chamber of Commerce: Philip A. Roll, Chairman; Peninsula Airways, Inc., Airport Manager.
 Fort Pierce—Chamber of Commerce: H. T. Enns, Jr., Chairman.
 Lake Wales—Chamber of Commerce: H. A. Thullbery, Chairman.
 Miami—Municipal Aviation Board: J. E. Yonge, Chairman; A. H. Heermance, Airport Manager.
 Mt. Dora—Chamber of Commerce: Wm. Tanton, Airport Manager.
 Mariou—Chamber of Commerce: George MacKay, Chairman; H. J. Chiddix.
 Orlando—Chamber of Commerce: E. C. Nilson, Chairman and Airport Manager.
 St. Petersburg—Chamber of Commerce: J. M. Cooper, Airport Manager.
 Sarasota—Chamber of Commerce: C. A. Barnes, Chairman.
 Tampa—Board of Trade: Carl D. Brorein, Chairman; Capt. A. B. McMullen, Airport Manager.
 Tarpon Springs—Chamber of Commerce: Pendleton Edgar, Chairman and Airport Manager.
 Tavares—Chamber of Commerce: T. E. Estey, Chairman.

GEORGIA

Atlanta—Chamber of Commerce: G. C. Bowden, Chairman; W. B. Hartsfield, Airport Manager.
 Augusta—Board of Commerce: J. Bothwell Lee, Chairman.
 Rome—Chamber of Commerce: U. N. Howell, Chairman; R. C. Stroup, Airport Manager.

Thomasville—Chamber of Commerce: Frank Mitchell, Chairman.
Tifton—Board of Trade: Roy Thrasher, Chairman.
Valdosta—Chamber of Commerce: J. D. Gould, Jr., Chairman.

IDAHO

Moscow—Chamber of Commerce: Major Fuller, Chairman.
Wallace—Board of Trade: A. J. Dunn, Chairman.

ILLINOIS

Bloomington—Association of Commerce: F. E. Purcell, Chairman; G. C. Bell, Airport Manager.
Cairo—Association of Commerce: J. P. Schuh, Chairman.
Carlinville—Chamber of Commerce: B. M. Burke, Airport Manager.
Champaign—Chamber of Commerce: Merv Ator, Airport Manager.
Chicago—Association of Commerce: G. B. Foster, Chairman; J. C. Casey, Airport Manager.
Decatur—Association of Commerce: Chas. Ruedi, Chairman; W. F. Lansing, Airport Manager.
De Kalb—Chamber of Commerce: J. J. Kingsley, Chairman.
Dixon—Chamber of Commerce: S. W. Watson, Chairman.
Galesburg—Chamber of Commerce: Julian Mack, Chairman.
Harvey—Chamber of Commerce: R. D. White, Chairman.
Joliet—Chamber of Commerce: F. O. Wilhelm, Airport Manager.
La Salle—Chamber of Commerce: W. T. Bedford, Chairman.
Litchfield—Chamber of Commerce: Chaney Spence, Chairman.
Ottawa—Chamber of Commerce: W. A. Dicus, Chairman.
Peoria—Association of Commerce: Paul Casey, Chairman; Varney Aircraft Corporation, Airport Manager.
Quincy—Chamber of Commerce: F. J. Bonjoey, Airport Manager.
Rockford—Chamber of Commerce: W. H. Williamson, Chairman; F. MacChesney, Airport Manager.
Springfield—Chamber of Commerce: Chas. Hodgson, Chairman; Craig Isbel, Airport Manager.
Streator—Chamber of Commerce: Wm. Anthony, Chairman.
Urbana—Association of Commerce: T. A. Burt, Chairman.
Watseka—Chamber of Commerce: C. N. Saum, Chairman.

INDIANA

Anderson—Chamber of Commerce: E. S. Ridley, Chairman; Orin Welch, Airport Manager.
Elkhart—Chamber of Commerce: Tom H. Keene, Chairman.
Hammond—Chamber of Commerce: W. Bliss, Airport Manager.
Huntington—Chamber of Commerce: Win Runyan, Chairman; Mayor C. W. Snider, Airport Manager.
Kokomo—Chamber of Commerce: W. B. Dye, Chairman; Clyde Shockley, Airport Manager.

La Porte—Chamber of Commerce: F. R. Liddell, Chairman.
Muncie—Commercial Club: Judge W. B. Condit, Chairman.
Muncie—Chamber of Commerce: R. L. Stephens, Airport Manager.

IOWA

Burlington—Greater Burlington Assn.: G. W. Bond, Chairman; A. J. Hartman, Airport Manager.
Centerville—Association of Commerce: J. C. Price, Chairman.
Clinton—Chamber of Commerce: G. E. Dommitt, Chairman.
Des Moines—Chamber of Commerce: G. W. Est, Chairman; F. A. Mathis, Airport Manager.
Fort Dodge—Chamber of Commerce: W. B. Swaney, Chairman; C. I. Sherwood, Airport Manager.
Keokuk—Chamber of Commerce: W. A. Logan, Chairman.
Mason City—Chamber of Commerce: W. Earl Hall, Chairman; Sam Geisel, Airport Manager.
Waterloo—Greater Waterloo Assn.: A. B. Chambers, Airport Manager.

KANSAS

Arkansas City—Chamber of Commerce: W. C. Robinson, Jr., Chairman; Lee Lawson, Airport Manager.
Atchison—Chamber of Commerce: Ralph Shelly, Chairman.
Caney—Chamber of Commerce: H. Everett, Chairman; Truskett & Truskett, Airport Manager.
Chanute—Chamber of Commerce: Homer Bredouw, Chairman; M. Barnes, Airport Manager.
Coffeyville—Chamber of Commerce: Oscar Jensen, Chairman; Tom Hill, Airport Manager.
Fort Scott—Chamber of Commerce: Frank Stone, Chairman.
Hutchinson—Chamber of Commerce: E. Friesen, Chairman; R. G. Streeter, Airport Manager.
Iola—Chamber of Commerce: B. T. Barber, Chairman and Airport Manager.
Ottawa—Chamber of Commerce: J. M. Conard.
Salina—Chamber of Commerce: L. N. Hudgens.
Topeka—Chamber of Commerce: J. A. Brouette, Chairman.
Wichita—Chamber of Commerce: J. H. Turner, Chairman; B. C. Wells, Airport Manager.
Winfield—Chamber of Commerce: M. F. Jarvis, Chairman; H. E. Truskett, Airport Manager.

KENTUCKY

Louisville—Board of Trade: A. H. Bowman, Chairman; Virgil Hine, Airport Manager.

LOUISIANA

Baton Rouge—Chamber of Commerce: T. S. Jones, Chairman.
Crowley—Association of Commerce: J. F. Suddoth, Chairman.
Lafayette—Chamber of Commerce: W. N. Thilmony, Chairman.

Lake Charles—Association of Commerce: J. A. Partridge, Chairman and Airport Manager.
 Monroe—Chamber of Commerce: Travis Oliver, Chairman and Airport Manager.
 New Orleans—Association of Commerce: Adj. Gen. L. A. Toombs, Chairman; George Hero, Airport Manager.
 Shreveport—Chamber of Commerce: Col. D. W. Spurlock, Chairman; Chamber of Commerce, Airport Manager.

MAINE

Portland—Chamber of Commerce: P. M. Payson, Chairman; A. H. Andrews, Airport Manager.
 Rockland—Chamber of Commerce: Geo. W. Snow, Chairman.

MARYLAND

Hagerstown—Chamber of Commerce: F. L. Bentz, Chairman.

MASSACHUSETTS

Beverly—Chamber of Commerce: Fred A. Newman, Chairman.
 Boston—Chamber of Commerce: A. L. Richmond, Chairman; D. G. Duke, Airport Manager.
 Fall River—Chamber of Commerce: B. Morton, Chairman; C. Miller, Airport Manager.
 Framingham—Chamber of Commerce: Carl Dror, Chairman.
 Gardner—Chamber of Commerce: C. H. Hartshorn, Chairman.
 Gloucester—Chamber of Commerce: G. B. Low, Chairman; L. J. Hart, Airport Manager.
 Holyoke—Chamber of Commerce: W. H. Hubbard, Chairman; C. Heneond, Airport Manager.
 Cape Cod—Chamber of Commerce: R. Ayling, Airport Manager.
 Lowell—Chamber of Commerce: W. C. Wilson, Chairman; J. Ligare, Airport Manager.
 Malden—Chamber of Commerce: F. R. Kaufback, Chairman.
 North Adams—Chamber of Commerce: S. W. Potter, Chairman.
 Pittsfield—Chamber of Commerce: E. E. Ferry, Chairman.
 Quincy—Chamber of Commerce: H. T. Dennison, Chairman and Airport Manager.
 Springfield—Chamber of Commerce: A. B. Wallace, Chairman.

MICHIGAN

Ann Arbor—Chamber of Commerce: F. De Vine, Chairman; L. Flo, Airport Manager.
 Battle Creek—Chamber of Commerce: R. R. Thomson, Chairman; L. S. Knowles, Airport Manager.
 Bay City—Chamber of Commerce: L. P. Keegen, Chairman.
 Cadillac—Chamber of Commerce: G. G. Brown, Chairman; C. R. Smith, Airport Manager.
 Flint—Chamber of Commerce: S. S. Stewart, Chairman.
 Grand Haven—Chamber of Commerce: F. C. McCrea, Chairman; Wm. Connelly, Airport Manager.

Hastings—Commercial Club: A. H. Carveth, Chairman.
 Kalamazoo—Chamber of Commerce: C. S. Carney, Chairman; E. S. Weber, Airport Manager.
 Manistee—Board of Commerce: S. C. Thompson, Chairman; Otto Danrow, Airport Manager.
 Mount Clemens—Board of Commerce: S. Norton Price, Chairman.
 Niles—Chamber of Commerce: W. F. Harrah, Chairman; W. E. Kysor, Airport Manager.
 St. Joseph—Chamber of Commerce: J. J. Theisen, Chairman.
 Sebawaing—Chamber of Commerce: Fred Kroll, Chairman.
 South Haven—Chamber of Commerce: Dr. J. C. Arnold, Chairman.
 Ypsilanti—Board of Commerce: G. H. Swanson, Chairman; Knapp Flying Service, Inc., Airport Manager.

MINNESOTA

Albert Lea—Business Men's League: Hal-
 dor Knatvold, Chairman.
 Eveleth—Chamber of Commerce: Al Johnson, Chairman.
 Minneapolis—Civic and Commerce Assn.: A. R. Rogers, Chairman.
 Moorhead—Chamber of Commerce: Jack Lamb, Chairman.
 St. Cloud—Chamber of Commerce: J. A. Bensen, Chairman.
 St. Paul—Association of Public and Business Affairs: Geo. K. Gann, Chairman; F. J. Geng, Airport Manager.
 Virginia—Chamber of Commerce: A. E. Bickford, Chairman.

MISSISSIPPI

Gulfport—Chamber of Commerce: Hon. Jos. W. Milner, Chairman.
 Jackson—Chamber of Commerce: Mayor Walter A. Scott, Chairman.
 Laurel—Chamber of Commerce: Henry Hilbun, Chairman.
 Meridian—Chamber of Commerce: L. C. Pope, Chairman.

MISSOURI

Columbia—Chamber of Commerce: Alton Bros., Airport Manager.
 Jefferson City—Chamber of Commerce: Col. A. Linxwiler, Chairman and Airport Manager.
 Kansas City—Chamber of Commerce: W. E. Morton, Chairman; M. S. Murray, Airport Manager.
 St. Louis—Chamber of Commerce: Stanley Clarke, Chairman; O. E. Scott, Airport Manager.

MONTANA

Billings—Commercial Club: H. E. Reckard, Chairman.
 Butte—Chamber of Commerce: A. Perham, Chairman; M. P. Alexander, Airport Manager.
 Glasgow—Chamber of Commerce: Dr. A. N. Smith, Chairman.
 Helena—Commercial Club: R. E. Towle, Chairman; Wm. G. Ferguson, Airport Manager.

NEBRASKA

Alliance—Chamber of Commerce: Martin Jacobsen, Chairman.
 Columbus—Chamber of Commerce: Dr. E. E. Koebbe, Chairman.
 Kearney—Chamber of Commerce: Guy Henninger, Chairman.
 Lincoln—Chamber of Commerce: J. H. Markel, Chairman; Ray Page, Airport Manager.
 McCook—Chamber of Commerce: C. W. Kelley, Chairman.
 York—York County Commercial Club: Walter Hughes, Chairman.

NEVADA

Reno—Chamber of Commerce: Chas. Haseman, Chairman.

NEW HAMPSHIRE

Claremont—Chamber of Commerce: Roy E. Dodge, Airport Manager.
 Concord—Chamber of Commerce: Harold Cheney, Chairman; W. D. Thompson, Airport Manager.
 Keene—Chamber of Commerce: P. F. Safford, Chairman.
 Lebanon—Chamber of Commerce: H. B. Jackson, Chairman.

NEW JERSEY

Camden—Chamber of Commerce: G. B. Robeson, Chairman.
 Newark—Chamber of Commerce: P. J. O'Toole, Jr., Airport Manager.
 Paterson—Chamber of Commerce: Col. W. A. Cadmus, Chairman.
 Trenton—Chamber of Commerce: S. L. Tattersall, Chairman.

NEW MEXICO

Carlsbad—Chamber of Commerce: G. V. Price, Chairman.
 Silver City—Grant County Chamber of Commerce: J. A. McCallum, Chairman; Chino Copper Company, Airport Manager.

NEW YORK

Albany—Chamber of Commerce: C. D. Hakes, Chairman.
 Auburn—Chamber of Commerce: F. L. Emerson, Chairman.
 Brooklyn—Chamber of Commerce: Chas. H. Colvin, Chairman; Michael Cosgrove, Airport Manager.
 Buffalo—Chamber of Commerce: E. M. Ronne, Airport Manager.
 Carthage—Chamber of Commerce: H. D. O'Keefe, Chairman.
 Corning—Chamber of Commerce: Kenneth Norton, Chairman.
 Elmira—Association of Commerce: Sherman Voorhees, Chairman; E. L. Segur, Airport Manager.
 Geneva—Chamber of Commerce: E. E. Snelgrove, Chairman; S. E. Punnett, Airport Manager.
 Glens Falls—Chamber of Commerce: G. S. Jamison, Chairman; F. Bourque, Airport Manager.
 Gloversville—Chamber of Commerce: C. H. Colvin, Chairman.
 Herkimer—Chamber of Commerce: Guy H. Little, Vice-Chairman.
 Ithaca—Chamber of Commerce: Jerome Fried, Chairman.

Newburgh—Chamber of Commerce: Frederick Stern, Chairman.

Niagara Falls—Chamber of Commerce: B. J. O'Reilly, Chairman.

Norwich—Chamber of Commerce: Warren Eaton, Chairman and Airport Manager.

Olean—Chamber of Commerce: R. N. Forbes, Chairman.

Oneida—Chamber of Commerce: Paul Froass, Chairman.

Saratoga Springs—Chamber of Commerce: R. R. Ritchie, Chairman.

Schenectady—Chamber of Commerce: H. C. Ritchie, Chairman; B. A. Rickard, Airport Manager.

Tonawanda—Chamber of Commerce: B. G. Rand, Chairman.

Utica—Chamber of Commerce: Egbert Bagg, Chairman.

Watertown—Chamber of Commerce: H. W. Conde, Chairman; F. H. Taylor, Airport Manager.

NORTH CAROLINA

Asheville—Chamber of Commerce: J. A. Richbourg, Chairman; Roger Miller, Airport Manager.
 Burlington—Chamber of Commerce: W. S. Coulter, Chairman.
 Elizabeth City—Chamber of Commerce: W. O. Saunders, Chairman.
 North Wilkesboro—Chamber of Commerce: C. S. Coffey, Airport Manager.
 Raleigh—Chamber of Commerce: W. C. Olsen, Chairman; Mayor E. E. Culbreth, Airport Manager.
 Rocky Mount—Chamber of Commerce: J. D. Winstead, Airport Manager.
 Salisbury—Chamber of Commerce: Sam Carter, Chairman.
 Shelby—Chamber of Commerce: C. L. Eskridge, Chairman and Airport Manager.
 Wilmington—Chamber of Commerce: Addison Hewlett, Chairman.
 Winston-Salem—Chamber of Commerce: Hon. Thomas Barber, Chairman; Reynolds Airways, Airport Manager.

NORTH DAKOTA

Devils Lake—Civic and Commerce Assn.: C. S. McCulloch, Chairman.
 Grand Forks—Commercial Club: Dr. H. W. F. Iaw, Chairman.
 Valley City—Commercial Club: Glenn Levitt, Chairman.

OHIO

Akron—Chamber of Commerce: J. B. Huber, Chairman.
 Ashtabula—Chamber of Commerce: T. P. Fitzgerald, Chairman.
 Canton—Chamber of Commerce: Wm. T. Kuhns, Chairman.
 Coshocton—Business Men's Assn.: J. J. Dolan, Chairman.
 Cincinnati—Chamber of Commerce: C. A. Hirsch, Chairman; J. G. Colgan, Airport Manager.
 Cleveland—Chamber of Commerce: D. S. Ingalls, Chairman; John Berry, Airport Manager.
 Columbus—Chamber of Commerce: J. M. Vorys, Chairman; F. A. McKee, Airport Manager.

Conneaut—Chamber of Commerce: G. M. Whitney, Chairman.
 Dayton—Chamber of Commerce: J. F. Ahlers, Chairman; E. A. Johnson, Airport Manager.
 Defiance—Chamber of Commerce: R. C. Albertus, Chairman.
 Findlay—Findlay Chamber of Commerce: A. E. Brandeberry, Chairman.
 Hamilton—Chamber of Commerce: O. A. Anderson, Chairman and Airport Manager.
 Kent—Chamber of Commerce: R. L. Deuaghy, Chairman.
 Kenton—Chamber of Commerce: E. H. McFarland, Chairman.
 Lancaster—Chamber of Commerce: I. W. Deffenbaugh, Chairman.
 Mansfield—Chamber of Commerce: Alan Tappan, Chairman.
 Portsmouth—Chamber of Commerce: A. F. Young, Chairman; Pat Love, Airport Manager.
 Sidney—Chamber of Commerce: Frank Hetzel, Chairman.
 Springfield—Chamber of Commerce: Henry Becklay, Chairman; W. Flack, Airport Manager.
 Toledo—Chamber of Commerce: T. G. Gallagher, Chairman; G. C. Harman, Airport Manager.
 Youngstown—Chamber of Commerce: I. E. Sprinkle, Chairman.
 Zanesville—Chamber of Commerce: F. J. Grant, Chairman.

OKLAHOMA

Ardmore—Chamber of Commerce: H. T. Vernon, Chairman; A. Oakley, Airport Manager.
 Bartlesville—Chamber of Commerce: H. D. Cannon, Chairman; B. Parker, Airport Manager.
 Chickasha—Chamber of Commerce: Dr. L. E. Emanuel, Chairman.
 Clinton—Chamber of Commerce: S. R. Coffman, Airport Manager.
 Duncan—Chamber of Commerce: B. F. Saye, Chairman; Chamber of Commerce, Airport Manager.
 Durant—Chamber of Commerce: J. T. Foote, Chairman.
 McAlester—Chamber of Commerce: W. H. Fuller, Chairman.
 Muskogee—Chamber of Commerce: W. G. Gibbons, Chairman; A. C. Strickland, Airport Manager.
 Oklahoma City—Chamber of Commerce: H. C. Martin, Chairman; H. W. Parker, Airport Manager.
 Okmulgee—Chamber of Commerce: F. M. Wood, Chairman.
 Ponca City—Chamber of Commerce: H. C. Mulroy, Chairman; Wm. Tuttle, Airport Manager.
 Tulsa—Chamber of Commerce: J. F. Matchett, Chairman; D. A. McIntyre, Airport Manager.

OREGON

Baker—Baker County Chamber of Commerce: E. L. Crockatt, Chairman.
 Corvallis—Chamber of Commerce: Paul Walters, Chairman.
 Klamath Falls—Klamath County Chamber of Commerce: J. A. Gordon, Chairman.

Medford—Chamber of Commerce: S. V. Hall, Chairman and Airport Manager.
 Portland—Chamber of Commerce: J. L. Meier, Chairman; J. H. Polhemus, Airport Manager.

PENNSYLVANIA

Bradford—Board of Commerce: C. L. White, Chairman; C. L. White, Airport Manager.
 Butler—Board of Commerce: A. C. Moxey, Chairman.
 Carlisle—Chamber of Commerce: J. S. Garland, Chairman.
 Easton—Board of Trade: John Stead, Chairman.
 Erie—Chamber of Commerce: Wm. J. Stern, Chairman.
 Grove City—Commercial Club: F. A. Mills, Chairman.
 Harrisburg—Chamber of Commerce: F. A. Robbins, Jr., Chairman.
 Hazleton—Chamber of Commerce: E. B. Markle, Chairman.
 Johnstown—Chamber of Commerce: R. S. Waters.
 Milton—Chamber of Commerce: Oscar Miles, Chairman.
 Lebanon—Chamber of Commerce: H. L. Wilder, Chairman.
 Philadelphia—Chamber of Commerce: Hollinshead N. Taylor, Chairman.
 Reading—Chamber of Commerce: J. P. Wolfinger, Chairman; A. K. Owen, Airport Manager.
 Scranton—Chamber of Commerce: Wm. F. Hallstead, Chairman.
 Uniontown—Chamber of Commerce: W. L. Byers, Chairman; E. B. Bayley, Airport Manager.
 Wilkes-Barre—Chamber of Commerce: Col. E. G. Smith, Chairman.
 Williamsport—Chamber of Commerce: W. H. Norton, Chairman.
 York—Chamber of Commerce: Frank Wogan, Chairman.

SOUTH CAROLINA

Florence—Chamber of Commerce: M. D. Heath, Airport Manager.
 Spartanburg—Chamber of Commerce: J. C. Grier, Chairman; A. P. Kerr, Airport Manager.

SOUTH DAKOTA

Canton—Chamber of Commerce: A. N. Bragstad, Airport Manager.
 Huron—Chamber of Commerce: C. R. Smith, Chairman; Chamber of Commerce, Airport Manager.
 Sioux Falls—Chamber of Commerce: Rush Brown, Chairman.

TENNESSEE

Memphis—Chamber of Commerce: R. W. Haverty, Chairman; H. T. Dawkins, Airport Manager of New Bry's Airport; V. C. Omie, Airport Manager of Armstrong Field.
 Tullahoma—Chamber of Commerce: S. L. Cook, Chairman.

TEXAS

Austin—Chamber of Commerce: Max Bicklet, Chairman; Webb Ruff, Airport Manager.

Beaumont—Chamber of Commerce: W. M. Crook, Chairman; F. L. Bertschler, Airport Manager.
 Corpus Christi—Chamber of Commerce: Ralph Bradford, Chairman.
 El Paso—Chamber of Commerce: Malcolm Carpenter, Chairman; R. N. Mullin, Airport Manager.
 Fort Worth—Chamber of Commerce: J. R. Penn, Chairman; Wm. R. Fuller, Airport Manager.
 Jefferson—Chamber of Commerce: L. G. Braden, Chairman.
 Laredo—Chamber of Commerce: E. G. Clingenpeel, Chairman.
 Marshall—Chamber of Commerce: Hobart Key, Chairman.
 Port Arthur—Chamber of Commerce: Ed. F. Lohmann, Chairman; F. P. Dodge, Airport Manager.
 Sherman—Chamber of Commerce: Lee Simmons, Chairman.
 Waco—Chamber of Commerce: F. Stevens, Chairman; L. S. Andrews, Airport Manager.
 Wichita Falls—Chamber of Commerce: C. W. Cahoon, Chairman.

UTAH

Ogden—Chamber of Commerce: W. R. Kimball, Chairman.
 Salt Lake City—Chamber of Commerce: B. F. Redman, Chairman; H. Finch, Airport Manager.

VIRGINIA

Harrisonburg—Chamber of Commerce: J. R. Crown, Chairman.
 Newport News—Chamber of Commerce: O. K. Brown, Chairman.

VERMONT

Burlington—Chamber of Commerce: M. G. Beebe, Chairman.
 Rutland—Chamber of Commerce: G. W. Peck, 3rd, Chairman.
 Springfield—Chamber of Commerce: H. T. Laffin, Chairman and Airport Manager.

WASHINGTON

Bellingham—Chamber of Commerce: C. A. Morse, Chairman.

Colfax—Chamber of Commerce: J. R. Good, Chairman.
 Ellensburg—Chamber of Commerce: C. D. Gray, Chairman.
 Everett—Chamber of Commerce: J. R. Scott, Chairman and Airport Manager.
 Hoquiam—Chamber of Commerce: S. J. Coull, Chairman and Airport Manager.
 Longview—Chamber of Commerce: H. L. Beverly, Chairman and Airport Manager.
 Mount Vernon—Chamber of Commerce: C. J. Henderson, Chairman.
 Olympia—Chamber of Commerce: P. G. Schmidt, Chairman.
 Seattle—Chamber of Commerce: R. S. Boyns, Chairman.
 Spokane—Chamber of Commerce: J. A. Reinhardt, Chairman; J. T. Fancher, Airport Manager.
 Tacoma—Chamber of Commerce: L. E. Wilkeson, Chairman; R. F. Bradley, Airport Manager.
 Walla Walla—Chamber of Commerce: A. C. Thomas, Chairman.
 Yakima—Chamber of Commerce: E. Schneider, Chairman; E. Riley, Airport Manager.

WEST VIRGINIA

Beckley—Chamber of Commerce: C. Hodel, Chairman.
 Moundsville—Chamber of Commerce: J. A. Sigafosse, Chairman; J. W. Hunt, Airport Manager.
 Parkersburg—Board of Commerce: G. A. Cooper, Chairman.

WISCONSIN

Appleton—Chamber of Commerce: F. E. Schlitz, Chairman.
 Kenosha—Chamber of Commerce: E. Pedley, Chairman.
 Madison—Association of Commerce: A. Lindauer, Chairman; E. N. Quinn, Airport Manager.

WYOMING

Casper—Chamber of Commerce: E. D. Holmes, Chairman.
 Cheyenne—Chamber of Commerce: Cal Holliday, Chairman; H. B. Shaver, Airport Manager.

NATIONAL ELIMINATION BALLOON RACE**Akron, Ohio, May 30, 1927**

<i>Position</i>	<i>Entry</i>	<i>Pilot and Aide</i>	<i>Place of Landing</i>	<i>Distance Miles</i>
1.*	Goodyear T. & R. Co. V Akron, Ohio	W. T. VanOrman W. W. Morton	1 mi. southwest Hancock, Me.	718
2.*	Detroit Flying Club No. 3 Detroit, Mich.	E. J. Hill A. G. Schlosser	8 mi. west Skowhegan, Me.	650
3.*	U. S. Army Air Corps S261 Scott Field, Ill.	Capt. W. E. Kepner Lt. W. O. Earceckson	1 mi. west Biddleford, Me.	595
4.	Scripps-Howard Newspapers Ohio League	J. A. Boettner J. F. Cooper	2½ mi. north E. Bolton, Que., Can.	562
5.	Detroit Flying Club No. 2 Detroit, Mich.	S. A. U. Rasmussen W. A. Klikoff	6 mi. southeast Laconia, N. H.	546
6.	U. S. Army Air Corps S262 Scott Field, Ill.	Lt. J. A. Powell Maj. M. R. Smith	Malone, N. Y.	456
7.	U. S. Army Air Corps S265 Langley Field, Va.	Lt. Paul Everet Lt. R. R. Gillespie	5½ mi. north Cranberry Lake, N. Y.	412
8.	U. S. Navy S97 Lakehurst, N. J.	Lt. T. G. W. Settle Geo. W. Steelman	Pope Mills, N. Y.	393
9.	St. Louis Rotary Club St. Louis, Mo.	H. E. Honeywell R. H. Tait, Jr.	6 mi. west Brockville, Ont., Can.	384
10.	U. S. Army Air Corps S243 Norton Field, Ohio	Lt. Frank McKee Capt. S. T. Moore,	Martinsburg, Lewis County, N. Y.	362
11.	Detroit Flying Clubs No. 1 Detroit, Mich.	C. D. Williams, Jr. G. M. LeGallee	1½ mi. west Parksville Sta., N. Y.	352
12.	"Davey Tree" Expert Co. Kent, Ohio	R. P. Lehr C. H. Roth	3½ mi. east Starrucca, Pa.	320
13.	Akron Beacon Journal Akron, Ohio	C. K. Wollam Howard Wolf	Harperville, N. Y.	315
14.	U. S. Navy S98 Lakehurst, N. J.	Lt. Chas. Bauch Lt. F. R. Riechelderfer	4 mi. east Skaneateles, N. Y.	294
15.	U. S. Navy S5861 Lakehurst, N. J.	Lt. G. V. Whittle Franklin Masters	3 mi. south Keating Summit, Pa.	176

*Place winners on U. S. Team in International Gordon Bennett Race, Denver, Colo., September 10, 1927.

INTERNATIONAL GORDON BENNETT BALLOON RACE

Ford Airport, Near Dearborn, Mich., September 10, 1927

<i>Country</i>	<i>Balloon</i>	<i>Pilot and Aide</i>	<i>Landing</i>	<i>Distance</i>
1. United States	Detroit	E. J. Hill A. G. Schlosser	Baxley, Ga.	745 miles 1198.9 km.
2. Germany	Barmen	Hugo Kaulen Alexander Dahl	4 mi. S. W. of Ft. Valley, Ga.	688 miles 1107.2 km.
3. United States	Goodyear	W. T. Van Orman W. W. Morton	3½ mi. N. of Adrian, Ga.	685 miles 1102.4 km.
4. France	Lafayette	Georges Blanchet Dr. G. M. LeGallee	2½ mi. E. of Waverly Hall, Ga.	600 miles 1091.1 km.
5. Spain	Hispania	E. Maldonado B. Molas	3 mi. W. of Eutawville, S. C.	645 miles 1038.0 km.
6. Belgium	Belgica	E. Demuyter M. DeSoete	13 mi. N. W. of Florence, S. C.	600 miles 965.6 km.
7. Germany	Munster	F. Eimermacher Dr. R. Predeck	Prosperity, S. C.	575 miles 925.3 km.
8. Italy	Dux	Domenico Leone Ugo Medori	5 mi. S. of Whitmire, S. C.	570 miles 917.3 km.
9. France	Paris-Bruxelles	M. Bienaime A. Veenstra	7 mi. S. of Dunn, S. C.	552 miles 888.3 km.
10. United States	U. S. Army	W. E. Kepner Wm. O. Eareckson	York, S. C.	530 miles 852.9 km.
11. Belgium	Wallonie	P. Quersin M. Theis	5 mi. S. E. of Greenville, S. C.	530 miles 852.9 km.
12. Italy	Rex	Eraldo Ilari G. Paonessa	5 mi. S. of Mooresboro, N. C.	500 miles 804.6 km.
13. Switzerland	Ilalvatia III	Ernest L. Maag Ernie Mageli	16 mi. N. W. of Statesville, N. C.	465 miles 748.3 km.
14. England	Bee	George Meager R. S. Booth	5 mi. N. E. of Clover, Va.	450 miles 724.2 km.
15. Germany	Ernst Brandenburg	Dr. A. Halben Hugo Kaulen, Jr.	Sugar Island Putinbay, Ohio	50 miles 80.4 km.

THE NATIONAL AIR RACES

NATIONAL AIR DERBY FROM NEW YORK TO SPOKANE CLASS "A" (Civilians Only)

Sept. 20, 1927

First Prize, \$10,000.00; Second Prize, \$5,000.00; Third Prize, \$2,000.00; Fourth Prize, \$1,000.00; Fifth Prize, \$500.00.						
Entry No.	Airplane	Entrant	Pilot	Elapsed Time	Place	
4	Laird	National Lead Battery Company	C. W. Holman	19:42:47.00	First	
6	Laird	E. M. Laird Co.	E. E. Ballough	20:18:10.00	Second	
11	Buhl	City of Spokane	N. B. Mamer	20:59:13.00	Third	
8	Waco	John P. Wood	John P. Wood	21:55:46.00	Fourth	
7	Yackey	Robt. M. Hoffman	E. Hamilton Lee	23:00:09.00	Fifth	
2	Yackey	Dr. C. C. Sloan	E. K. Campbell	23:17:66.00	Sixth	
12	Pitcairn	Pitcairn, Inc.	James Ray	25:36:36.00	Seventh	
3	Ryan	Cleveland Pneumatic Tool Company	E. W. Cleveland	25:48:52.00	Eighth	
1	Buhl	Buhl Aircraft Co.	Richard Hudson	Crashed en route		
5	Cessna	Cessna Aircraft Co.	R. G. Wyant	Failed to start		
9	Sikorski	Emil H. Burgin	Emil H. Burgin	Did not finish		
10	Ryan	Frank M. Hawks	Frank M. Hawks	Did not finish		
14	Travel Air	J. L. O'Donnell	J. L. O'Donnell	Did not finish		
17	Mohme Mono.	Mohme Aero Corp.	Steve Kaufman	Ruled ineligible		
28	Waco	Robt. S. Fogg	Robt. S. Fogg	Did not finish		

NATIONAL AIR DERBY FROM NEW YORK TO SPOKANE CLASS "B"

Sept. 19, 1927

First Prize, \$5,000.00; Second Prize, \$3,000.00; Third Prize, \$1,000.00; Fourth Prize, \$500.00; Fifth Prize, \$250.00						
Entry No.	Airplane	Entrant	Pilot	Elapsed Time	Place	
36	Waco	Berry Bros.	C. W. Meyers	30:23:15.00	First	
41	Eaglerock	Leslie C. Miller	Leslie C. Miller	30:47:13.00	Second	
32	Eaglerock	J. S. Charles	J. S. Charles	31:48:37.00	Third	
49	Travel Air	Eugene Detmer	Eugene Detmer	33:04:29.00	Fourth	
50	Travel Air	W. H. Emery, Jr.	W. H. Emery, Jr.	33:36:07.00	Fifth	
60	Waco	E. G. Knapp	E. G. Knapp	33:55:06.00	Sixth	
65	Waco	Towanda Aircraft Co.	Jack Ashcraft	36:50:37.00	Seventh	
51	Travel Air	K. R. Unger	K. R. Unger	37:07:27.00	Eighth	
39	American Eagle	C. B. McMahon	C. B. McMahon	37:20:53.00	Ninth	
31	Woodson	City of Olympia		Crashed en route		
33	Hess Bluebird	E. W. Fleet	E. W. Fleet	Did not finish		
34	Pitcairn	Pitcairn, Inc.	A. M. Banks	Did not finish		
35	Waco	Lawrence Pedigo	R. T. Quincy	Did not finish		
37	Monocoupe	Fargo Aero Club	Vern L. Roberts	Did not finish		
38	Eaglerock	Aero Corp. of Cal.	Paul E. Richter, Jr.	Crashed en route		
40	Waco	J. D. Brock	Tex LaGrone	Did not finish		
42	Eaglerock	Gerald Smith	Gerald Smith	Did not finish		
43	Swallow	R. R. Johnson	R. R. Johnson	Did not finish		
44	Waco	A. Litzemberger	A. Litzemberger	Did not finish		
45	International	J. C. Sams	Lt. Tomlinson	Changed to Pacific Coast Derby		
46	Eaglerock	H. E. Campbell	H. E. Campbell	Ruled out at New York		
47	Waco	A. W. Stephenson	A. W. Stephenson	Did not finish		
48	Waco	L. F. Hughes	Jack R. Adams	Did not finish		
52	Eaglerock	Maurice H. McMechan	Maurice H. McMechan	Did not finish		

Entry No.	Airplane	Entrant	Pilot	Elapsed Time	Place
53	Travel Air	M. M. Perea	R. W. Cantwell	Did not finish	
54	Swallow	Thos. I. Hill	J. B. Sadowsky	Did not finish	
55	Waco	Walter Stewart	R. E. Dake	Did not finish	
57	Popson	W. H. A. Boyd		Did not finish	
58		Walter N. Root		Failed to start	
59	American Eagle	John R. Stiles	Stephen Darius	Did not finish	
63		Aero Dev. Co.		Failed to start	
66	Laird	Nimmo Black	Nimmo Black	Did not finish	

PACIFIC COAST AIR DERBY FROM SAN FRANCISCO TO SPOKANE CLASS "A" (Civilians Only)

Sept. 21, 1927

First Prize, \$1,500.00; Second Prize, \$1,000.00; Third Prize, \$500.00

In addition to the cash prizes there will also be awarded a silver trophy to the first enclosed cabin cruiser to arrive in Spokane, Washington.

Entry No.	Airplane	Entrant	Pilot	Elapsed Time	Place
84	Travel Air	H. C. Lippiatt	H. C. Lippiatt	8:16:37.00	First
86	International	Thos. F. Wells	Lee Shoenhair	8:40:35.00	Second
82	Breese Mono	Breese Aircraft Co.	Vance Breese	10:05:24.00	Third
67	Fokker	Aero Corp. of Cal.	Jack Frye	10:06:23.00	Fourth
88	Imperial Mono.	Norman Godcard	Norman Godcard	12:37:35	Fifth

PACIFIC COAST AIR DERBY FROM SAN FRANCISCO TO SPOKANE CLASS "B"

Sept. 21, 1927

First Prize, \$1,000.00; Second Prize, \$500.00; Third Prize, \$250.00; Fourth Prize, \$150.00; Fifth Prize, \$100.00

Entry No.	Airplane	Entrant	Pilot	Elapsed Time	Place
81	International	R. N. Bergen	C. L. Langdon	9:59:18.00	First
87	Travel Air	Beacon Airways	D. C. Warren	10:18:14.00	Second
85	Eaglerock	Aero Corp. of Cal.	Lee Willey	10:27:28.00	Third
45	International	J. C. Sams	Lt. Tomlinson	Failed to start	
56	Brown	Los Angeles Airways	A. R. Borne	11:28:30.00	Fourth
83	Travel Air	Vernon Bookwalter	Vernon Bookwalter	Did not finish	
89	Eaglerock	J. R. Scott	Cliff DeFigh	Failed to start	
90	Travel Air	James Rinehart	James Rinehart	Did not finish	

NATIONAL AIR RACE, 1927

EVENT No. 1—AERO DIGEST TROPHY, SPORT PLANE RACE (Civilians Only)

Sept. 23, 1924

Total Prize, \$1,000.00, divided as follows: First, \$500.00; Second, \$250.00; Third, \$150.00; Fourth, \$100.00

All times computed by Monroe Calculator

Entry No.	Airplane	Entrant	Pilot	Speed	Place
62	E. B. Heath	E. B. Heath	E. B. Heath	74.443	First
37	Monocoupe	Fargo Aero Club		Failed to start	
31	Woodson	City of Olympia	Vern L. Roberts	Failed to start	
57	Popson	W. H. A. Boyd		Failed to start	

EVENT No. 3—WESTERN FLYING TROPHY, FREE-FOR-ALL RACE FOR TWO OR MORE PLACE LOW POWERED AIRPLANES (Civilians Only)

Entry		Total Prize—\$2,000.00, divided as follows: First, \$1,000.00; Second, \$600.00; Third, \$400.00.			
No.	Airplane	Entrant	Pilot	Speed	Place
49	Travel Air	Eugene Detmer	Eugene Detmer	102.555	First
38	Eaglerock	Aero Corp. of Cal.	Paul Richter, Jr.	99.993	Second
36	Waco	Berry Bros., Inc.	C. W. Meyers	98.760	Third
41	Eaglerock	Leslie Miller	Leslie Miller	98.545	Fourth
47	Travel Air	Beacon Airways	D. C. Warren	96.024	Fifth
85	Eaglerock	Aero Corp. of Cal.	Jack Frye	93.094	Sixth
45	International	J. C. Sams	Lt. Tomlinson	90.639	Seventh
65	Waco	Towanda Aircraft Co.	Jack Ashcraft	90.130	Eighth
50	Brown Mono.	Los Angeles Airways	A. R. Borne	88.941	Ninth
64	Waco	Rankin School	Tex Rankin	88.142	Tenth
32	Eaglerock	J. S. Charles	J. S. Charles	Did not finish	
37	Monocoupe	Fargo Aero Club	Vern Roberts	Crashed enroute	
90	Travel Air	James Rinehart	James Rinehart	Failed to start	
34	Pittsairn	Pittsairn, Inc.	A. M. Banks	Failed to start	
35	Waco	L. Pedigo	R. T. Quinby	Failed to start	
13	Waco	Rankin School		Failed to start	

EVENT No. 4—DAYTON DAILY NEWS LIGHT AIRPLANE TROPHY RACE FOR LIGHT AIRPLANES (Civilians Only)

Entry		Total Prize, \$1,000.00, divided as follows: First, \$500.00; Second, \$250.00; Third, \$150.00; Fourth, \$100.00.			
No.	Airplane	Entrant	Pilot	Speed	Place
62	Heath Parasol	E. B. Heath	E. B. Heath	73.417	First
61	Meteor Plane	Irwin Aircraft Co.	Jack Irwin	Failed to start	

EVENT No. 5—LIBERTY ENGINE BUILDERS' TROPHY RACE FOR OBSERVATION TYPE (TWO-PLACE) AIRPLANES (Military Only)

Prizes—Individual Trophy Awards to first, second, third, and fourth place winners.

Entry	Airplane	Entrant	Pilot	Speed	Place
No.					
8	Curtiss XO 13A	Lt. H. A. Johnson	Lt. H. A. Johnson	170.156	First
9	Curtiss XO 13A	Lt. G. A. McHenry	Lt. G. A. McHenry	164.039	Second
4	Douglas O-2-C	Lt. W. R. Taylor	Lt. W. R. Taylor	129.395	Third
7	Douglas O-2-C	Lt. V. A. Grant	Lt. V. A. Grant	123.488	Fourth
5	Douglas O-2-C	Lt. W. K. Burgess	Lt. W. K. Burgess		Fifth*

EVENT No. 6—PACKARD MOTOR CAR COMPANY TROPHY RACE FOR LARGE CAPACITY AIRPLANES (Military Only)

Entry		Prizes—Individual Trophy Awards to first, second, third, and fourth place winners.			
No.	Airplane	Entrant	Pilot	Speed	Place
10	Fokker C-2	Lt. H. W. Beaton	Lt. H. W. Beaton	115.198	First
13	Douglas C-1	Lt. W. H. Doolittle	Lt. W. H. Doolittle	100.243	Second
12	Douglas C-1-C	Lt. T. J. Koenig	Lt. T. J. Koenig	81.285	Third

*Out on 12th lap.

EVENT No. 7—RACE FOR PURSUIT TYPE ARMY PLANES

Prizes—Individual Trophy Awards to first, second, third, and fourth place winners.

Entry No.	Airplane	Entrant	Pilot	Speed	Place
11	Curtiss P-1-B	Lt. W. L. Cornelius	Lt. W. L. Cornelius	158.412	First
2	Curtiss P-1-B	Lt. I. A. Woodring	Lt. I. A. Woodring	155.046	Second
1	Curtiss P-1-B	Lt. L. C. Mallory	Lt. L. C. Mallory	153.806	Third
15	Boeing PW-9-A	Lt. W. A. Maxwell	Lt. W. A. Maxwell	153.583	Fourth

EVENT No. 8—SEATTLE CHAMBER OF COMMERCE TROPHY FREE-FOR-ALL RACE FOR TWO, THREE OR FOUR PLACE AIRPLANES (Civilians Only)

Prizes, \$2,500.00—First, \$1,000.00; Second, \$600.00; Third, \$400.00; Fourth, \$250.00; Fifth, \$150.00; Sixth, \$100.00.

All times computed by Monroe Calculator

Entry No.	Airplane	Entrant	Pilot	Speed	Place
15	Pitcairn	Pitcairn, Inc.	James Ray	136.145	First
6	Laird	E. M. Laird Co.	E. E. Ballough	136.009	Second
4	Laird	National Lead Battery Co.	C. W. Holman	133.097	Third
8	Waco	John P. Wood	John P. Wood	131.248	Fourth
12	Pitcairn	Pitcairn, Inc.	A. M. Banks	127.120	Fifth
29	Eaglerock	Alexander Aircraft Co.	Paul Richter, Jr.	125.684	Sixth
2	Yackey	Dr. C. C. Sloan	E. K. Campbell	122.294	Seventh
11	Buhl	City of Spokane	N. B. Mamer	125.376	Eighth
86	International	Thos. F. Wells	Lee Schoenhair	118.233	Ninth
88	Imperial Mono	N. A. Goddard	N. A. Goddard	117.565	Tenth
19	Ryan Brougham	Frank M. Hawks	Frank M. Hawks	116.318	Eleventh
7	Yackey	R. M. Hoffman	E. Hamilton Lee	113.607	Twelfth
14	Travel Air	J. L. O'Donnell	J. L. O'Donnell	Failed to start	
20	Hamilton	Hamilton Metal Plane Co.	John H. Miller	Failed to start	
28	Waco	Robt. S. Fogg	Robt. S. Fogg	Failed to start	
30	Stearman	Varney Airlines	L. D. Cuddeback	Failed to start	
36	Waco	Berry Bros., Inc.	C. W. Meyers	Entered in error*	
13	Waco	Rankin School	Tex Rankin	Failed to start	
1	Buhl	Buhl Aircraft Co.	R. Hudson	Failed to start	
5	Cessna	Cessna Aircraft Co.	R. G. Wyant	Failed to start	
16	Buhl	A. C. Spark Plug Co.	Lt. Royal	Failed to start	
17	Mohme Mono	Mohme Aero Co.	Steve Kaufman	Ineligible	
50	Brown	Los Angeles Airways	A. R. Borne	Failed to start	

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EVENT No. 10—"AERO DIGEST NATIONAL GUARD" TROPHY SPEED RACE FOR NATIONAL GUARD PILOTS AND PLANES

Total Prizes, \$1,000.00, divided as follows: First, \$500.00; Second, \$300.00; Third, \$150.00; Fourth, \$50.00

All times computed by Monroe Calculator

Entry No.	Airplane	Entrant	Pilot	Speed	Place
18	Douglass O-2	Capt. Tom Symons	Capt. Tom Symons	110.834	First
17	Douglass O-2	Capt. Harold Neely	Capt. Harold Neely	107.514	Second
5	D H	Capt. Ed. Axberg	Capt. Ed. Axberg	107.173	Third
1	D H	Lt. A. B. McKensie	Lt. A. B. McKensie		

*Withdrawn prior to race.

†kicked out for fouling pylon on 6th lap.

EVENT No. 11—DETROIT NEWS AIR TRANSPORT TROPHY AIR TRANSPORT SPEED AND EFFICIENCY RACE (Civilian Only)

Prizes—Speed: First, \$750.00; Second, \$300.00; Third, \$200.00. Efficiency: First, \$750.00; Second, \$300.00; Third, \$200.00.

All times computed by Monroe Calculator

Entry No.	Airplane	Entrant	Pilot	Speed	Place	Efficiency	Place
10	Ryan	Frank M. Hawks	Frank M. Hawks	104.837	First	905.011	Third
67	Fokker	Aero Corp. of Cal.	Jack Frye	100.065	Second	918.727	Second
20	Hamilton	Hamilton Metal Plane Co.	John H. Miller	96.080	Third	925.587	First
2	Yackey	Dr. C. C. Sican	E. K. Campbell	Ruled ineligible			
4	Laird	National Lead Battery Co.	C. W. Holman	Ruled ineligible			
6	Laird	E. M. Laird Co.	E. E. Ballough	Ruled ineligible			
7	Yackey	R. M. Hoffman	E. Hamilton Lee	Ruled ineligible			
11	Buhl	City of Spokane	N. B. Mamer	Ruled ineligible			
24	Stinson Mono.	Eddie Stinson	Eddie Stinson	Withdrawn in non-stop			
86	International	Thos. F. Wells	Lee Shoenhair	Ruled ineligible			
18	Bach Airyacht	Bach Aircraft Co.	Waldo Waterman	Failed to start			
5	Cessna Mono.	Cessna Aircraft Co.	R. G. Wyant	Failed to start			
17	Mohme	Mohme Aircraft Co.	Steve Kaufman	Ruled ineligible			
35	Waco	L. Pedigo	R. T. Quinby	Failed to start			

EVENT No. 12—SPOKANE SPOKESMAN-REVIEW TROPHY FREE-FOR-ALL MILITARY PURSUIT SHIP RACE

Prizes—Individual Trophy awards to first, second, third, and fourth place winners.

All times computed by Monroe Calculator

Entry No.	Airplane	Entrant	Pilot	Speed	Place
3	Curtiss Xp-6-A	Lt. E. C. Batten	Lt. E. C. Batten	201.239	First
14	Curtiss XP-6	Lt. A. J. Lyon	Lt. A. J. Lyon	189.608	Second
23	Boeing FB-5	Lt. T. P. Jeter	Lt. T. P. Jeter	176.940	Third
21	Boeing FB-5	Lt. G. F. Bogan	Lt. G. F. Bogan	173.937	Fourth
22	Boeing FB-5	Lt. H. E. Regan	Lt. H. E. Regan	172.872	Fifth
6	Boeing PW-9-C	Lt. C. H. Beverly	Lt. C. H. Beverly	169.731	Sixth
18	F-6 C-4	Lt. F. C. Rogers	Lt. F. C. Rogers	161.559	Seventh
11	Curtiss P-1-B	Lt. W. L. Cornelius	Lt. W. L. Cornelius	161.502	Eighth
2	Curtiss P-1-B	Lt. I. A. Woodring	Lt. I. A. Woodring	159.184	Ninth
1	Curtiss P-1-B	Lt. L. C. Mallory	Lt. L. C. Mallory*		

EVENT No. 13—ALEXANDER PANTAGES TROPHY RACE FOR PURSUIT TYPE NAVY PLANES

(Closed Event for Naval and Marine Corps)

Prizes—Individual Trophy Awards to first, second, third, and fourth place winners.

All times computed by Monroe Calculator

Entry No.	Airplane	Entrant	Pilot	Speed	Place
23	Boeing FP-5	Lt. T. P. Jeter	Lt. T. P. Jeter	177.040	First
21	Boeing FP-5	Lt. G. F. Bogan	Lt. G. F. Bogan	172.972	Second
22	Boeing FP-5	Lt. H. E. Regan	Lt. H. E. Regan	171.955	Third
18	F-6 C-4	Capt. F. O. Rogers	Capt. F. O. Rogers	159.838	Fourth
17	Curtiss D-12	Lt. L. H. Sanderson	Lt. L. H. Sanderson†		

*Ruled out, fourth lap cut pylon No. 2.

†Ruled out, cut pylon on third lap.

EVENT No. 2—AVIATION TOWN AND COUNTRY CLUB OF DETROIT TROPHY, LIGHT COMMERCIAL SPEED AND EFFICIENCY RACE (Civilians Only)

Total Prize, \$2,500.00, divided as follows: For Speed: First, \$500.00; Second, \$250.00. Third, \$100.00; For Efficiency: First, \$900.00; Second, \$500.00; Third, \$250.00.

Entry		All times computed by Monroe Calculator					
No.	Airplane	Entrant	Pilot	Speed	Place	Efficiency	Place
15	Pitcairn	Pitcairn, Inc.	James Ray	138.394	First	331.074	Third
6	Laird	National Lead Battery Company	E. E. Ballough	132.631	Second	296.513	Seventh
4	Laird	National Lead Battery Company	C. W. Holman	131.084	Third	293.054	Eighth
8	Waco	John P. Wood	John P. Wood	129.668	Fourth	288.547	Ninth
12	Pitcairn	Pitcairn, Inc.	A. M. Banks	124.623	Fifth	267.845	Twelfth
11	Buhl	City of Spokane	N. B. Mamer	121.913	Sixth	205.033	Fifteenth
29	Eaglerock	Alexander Aircraft Co.	Casey Jones	120.964	Seventh	270.430	Eleventh
2	Yackey	Dr. C. C. Sloan	E. K. Campbell	118.350	Eighth	245.350	Thirteenth
7	Yackey	Robt. M. Hoffman	E. Hamilton Lee	111.429	Ninth	244.017	Fourteenth
20	Hamilton Metalplane Co.	Hamilton Metalplane Co.	John H. Miller	99.091	Tenth	528.400	First
36	Waco	Berry Bros., Inc.	C. W. Meyers	97.711	Eleventh	328.030	Fifth
38	Eaglerock	Aero Corp. of Cal.	Paul Richter, Jr.	95.394	Twelfth	333.916	Second
32	Eaglerock	J. S. Charles	J. S. Charles	99.998	Thirteenth	329.030	Fourth
87	Travel Air	Beacon Airways	D. C. Warren	91.758	Fourteenth	321.189	Sixth
50	Brown Mono.	Los Angeles Airways	A. R. Borne	82.536	Fifteenth	284.312	Tenth
67	Fokker	Aero Corp. of Cal.	Jack Frye	Did not finish			
14	Travel Air	J. L. O'Donnell	J. L. O'Donnell	Failed to start			
13	Waco	Rankin School	Tex Rankin	Failed to start			
28	Waco	Robt. S. Fogg	Robt. S. Fogg	Failed to start			
5	Cesna Mono.	Cessna Aircraft Co.	R. G. Wyant	Failed to start			
17	Mohme Mono.	Mohme Aircraft Co.	S. Kaufman	Ruled ineligible			
31	Woodson	City of Olympia		Crashed enroute			

Appendix

THIRD NATIONAL RELIABILITY TOUR FOR THE FORD TROPHY

June 24—July 12, 1927				Stops made at 25 cities; route covered 4,200 miles.	
Order of Finish	Pilot	Plane	Entrant	Points	Cash Prize
1	Edward A. Stinson	Stinson-Detroit	Stinson Aircraft Co.	9853.7	\$2500.00
2	Randolph G. Page	Hamilton Metalplane	Hamilton Metalplane Co.	7863.51	2000.00
3	H. C. Mummert	Mercury MW-3	Aerial Service Corp.	7807.3	1750.00
4	Dean Mulford	*Ford-Stout All-Metal	Ford Motor Company	7609.8	1500.00
5	John P. Wood	Waco Ten	Advance Aircraft Co.	6857.0	1250.00
6	Leonard Flo	Stinson-Detroit	Stinson Aircraft Corp.	6386.8	1000.00
7	John Paul Riddle	Waco Ten	Advance Aircraft Co.	5785.5	750.00
8	Frank M. Hawks	Ryan Brougham	Ryan Air Lines	5688.8	550.00
9	Chas. W. Meyers	Waco Ten	Advance Aircraft Co.	5623.9	400.00
10	Louis G. Meister	Buhl Air-Sedan	Buhl Aircraft Co.	5375.7	300.00
11	James G. Ray—H. A. Elliott	Pitcairn PA-5	Pitcairn Aviation, Inc.	4666.3	200.00
12	E. W. Cleveland	Waco Ten	Cleveland Pneumatic Aeron. Co.	3725.5	200.00
13	Cloyd P. Cleavenger	Eaglerock	Alexander Aircraft Co.		200.00
(Finished at Detroit, but did not register at all control stations.)					
14	Paul R. Brandt	Eaglerock	Alexander Aircraft Co.	Did not finish	

*Noncontestant for prize awards.

LICENSED PILOTS

CLASSES OF LICENSES

Transport abbreviated (T)

Limited Commercial abbreviated (LC)

Industrial abbreviated (I)

Private abbreviated (P)

Aavang, M. V., 209 Milwaukee St., Elgin, Ill. (T)
 Abbey, E., Chanute Field, Rantoul, Ill. (T)
 Abbott, H. W., 566 Linden St., San Francisco, Calif. (T)
 Abrams, T., 214 United Bldg., Lansing, Mich. (T)
 Acosta, B. B., 222 Stewart Ave., Garden City, L. I., N. Y. (T)
 Addems, W. J., 1838 S. 5th Ave., Maywood, Ill. (T)
 Ahearn, R. L., % Gates Flying Service, Lodi, N. J. (T)
 Akers, F., Fighting Plane Sqd. 5, N.A.S., Hampton Roads, Va. (T)
 Alden, P. A., Jr., 117 Raleigh St., Rocky Mount, N. C. (T)
 Alessi, F. J., 816 St. Peters St., New Orleans, La. (I)
 Alexander, H., Mifflintown, Pa. (T)
 Alexander, J. A., 631 Stimson St., Detroit, Mich. (LC)
 Alexander, J. B., 2635½ W. Blvd., Los Angeles, Calif. (T)
 Alexander, J. D., Alexander Industries Bldg., Denver, Colo. (LC)
 Alexander, M. L., 715 Quachita Nat. Bank Bldg., Monroe, La. (T)
 Alexander, T. C., McCloud Hotel, Denver, Colo. (T)
 Alexander, W. H., % Jefferson Theater, St. Augustine, Fla. (T)
 Allan, A. L., Curtiss Air Sta., Atlantic City, N. J. (T)
 Allen, C. C., 916 H St., Sacramento, Calif. (LC)
 Allen, G. W., 308 Hargrave St., Inglewood, Calif. (T)
 Allen, L. C., Crissy Field, San Francisco, Calif. (T)
 Allen, L. S., % Curtiss Aeroplane & Motor Co., Garden City, N. Y. (T)
 Allen, R. C., 1721-23 McGee St., Kansas City, Mo. (T)
 Allensworth, A. J., 34 Parkhurst, Detroit, Mich. (T)
 Allison, E. M., Bellevue, Neb. (T)
 Alsbach, A. F., 521 E. Berry St., Ft. Wayne, Ind. (T)
 Amberg, I. S., 722 Farwell Bldg., Detroit, Mich. (T)
 Ambrose, F. J., Jr., 1612 Fifth Ave., Arnold, Pa. (T)
 Ames, F. L., 403 Commonwealth Ave., Boston, Mass. (T)
 Amis, W. N., McCook Field, Dayton, Ohio (T)
 Anderline, F. W., 3532 49th St., S. E., Portland, Ore. (T)
 Anderson, H. W., Box 1471, Frazo Rd., Halfway, Mich. (LC)
 Anderson, W. L., 455 S. Hillside Ave., Wichita, Kan. (P)
 Andre, F. J., 605 Davenport St., Knoxville, Tenn. (T)
 Andrews, H. G., 540 41st St., Sacramento, Calif. (T)

Andrews, L. S., Rich Field, Waco, Tex. (T)
 Andrews, W. V., Langley Field, Hampton Roads, Va. (T)
 Angell, H. R., Bolling Field, Washington, D. C. (T)
 Applegate, R. P., Lake Geneva, Wis. (T)
 Appling, G. S., 1056 S. Normandie, Los Angeles, Calif. (T)
 Aretz, L. I., R. R. C. Box 795, Indianapolis, Ind. (T)
 Armstrong, J. R., 429 Commerce St., Albany, Ga. (T)
 Arnold, C. F., 463½ Main St., Glastonbury, Conn. (P)
 Arnold, L., 804 N. 19th St., Omaha, Neb. (T)
 Arnold, L. P., Hotel Christie, Hollywood, Calif. (T)
 Arnold, R., % Good & Foster, Love Field, Dallas, Tex. (T)
 Ashcraft, J. W., % Gates Flying Circus, 17 Battery Pl., New York, N. Y. (T)
 Ashley, M. I., 223 Pierce Bldg., St. Louis, Mo. (T)
 Askew, D. A., P. O. Box 6817, Parkway St., Kansas City, Mo. (T)
 Asp, M. B., Fairfield Air Depot, Fairfield, Ohio (T)
 Atchison, T. E., 501 Adam Grant Bldg., 114 Sansom St., San Francisco, Calif. (T)
 Auer, S. F., 157 W. Water St., Milwaukee, Wis. (T)
 Austin, J. A., Mitchel Field, New York, N. Y. (T)
 Avery, W. L., 1199 Franklin Ave., Columbus, Ohio (T)
 Bach, J. E., 142 E. 21st St., Tulsa, Okla. (P)
 Bach, L. M., Clover Field, Santa Monica, Calif. (T)
 Backes, C., Chanute Field, Rantoul, Ill. (T)
 Baer, P. F., Ford Airport, Dearborn, Mich. (T)
 Baez, R., Jr., Chanute Field, Rantoul, Ill. (T)
 Bahl, E. G., 912 E. 25th St., Erie, Pa. (T)
 Baker, D. L., % Bridgeton Aircraft Corp., Anglum, Mo. (T)
 Baker, H. T., U. S. Naval Air Station, Hampton Roads, Va. (T)
 Baker, J. L., Box 2003, Tulsa, Okla. (I)
 Baker, R. L., 1641 Grindley Blvd., Dearborn, Mich. (T)
 Balchen, B., 622 Hackensack St., Hasbrouck Heights, N. J. (T)
 Balint, M. J., 3rd St., Fords, N. J. (P)
 Balliet, M. C., 920 Main St., Slatington, Pa. (LC)
 Ballough, E. E., % Aero Club of Illinois, 30 S. Michigan Ave., Chicago, Ill. (T)
 Bangs, R. H., 1628 Columbia Rd., Washington, D. C. (P)
 Banks, A. M., Balnew P. O., Baltimore, Md. (T)
 Banks, L., 2000 Arch St., Little Rock, Ark. (P)

- Banning, J. H., 917 W. Second, Ames, Iowa (LC)
- Barber, B. B., 185 Kenwood Ave., Rochester, N. Y. (T)
- Baringer, E. G., 514 Market St., Perkasie, Pa. (P)
- Barker, H., 745 E. 9th St., Salt Lake City, Utah (T)
- Barker, J. DeF., Office Chief Air Corps, Washington, D. C. (T)
- Barlow, A. R. S., 37 W. 92nd St., New York, N. Y. (LC)
- Barlow, F. E., 723 11th St., Rapid City, S. D. (T)
- Barnes, E. D., 1210 Gale Lane, Nashville, Tenn. (T)
- Barnes, J. M., % Air Mail Service, Salt Lake City, Utah (T)
- Barnes, P. F., R. F. D. No. 1, Tacoma, Wash. (T)
- Barnette, Von W., 210 Lane St., Dallas, Tex. (LC)
- Barrett, G. C., Delaware Bldg., Mason City, Iowa (T)
- Barron, J. M., Jr., 166 S. Cooper St., Memphis, Tenn. (I)
- Barrows, R. C., 805 Main St., Hartford, Conn. (T)
- Barrows, W. J., 68 Garden Road, Alameda, Calif. (T)
- Barrie, A. A., 338 North Ave., 57, Los Angeles, Calif. (T)
- Bartow, J. B., Ludington Philadelphia, Flying Ser., Paschal P. O., Philadelphia, Pa. (T)
- Barwick, J., 2611 E. 12th St., Kansas City, Mo. (T)
- Bassett, E. H., Langley Field, Va. (T)
- Bassett, R. J., 5218 Harper Ave., Chicago, Ill. (T)
- Bates, C. F., 1619 Bartlett Ave., Milwaukee, Wis. (P)
- Bates, L. R., University of California, Los Angeles, Calif. (T)
- Batten, E. C., McCook Field, Dayton, Ohio (T)
- Battle, J. A., Miller Field, New Dorp., Staten Island, N. Y. (T)
- Baughan, C. C., 1923 Harrison St., Philadelphia, Pa. (T)
- Baxter, H. R., Adjutant General's Department, Washington, D. C. (T)
- Bazley, H. R., 929 Norwich Ave., Pittsburgh, Pa. (P)
- Beach, I. S., 2411 E. Douglas, Wichita, Kan. (T)
- Beard, J. O., 728 7th St., N., St. Petersburg, Fla. (P)
- Beaton, H. W., Langley Field, Hampton Roads, Va. (T)
- Beatty, D. C., Roberts Field, Birmingham, Ala. (T)
- Becherer, H. M., 314 Alexander Bldg., Abilene, Tex. (T)
- Beck, E. S., 39 Highland Ave., Arlington, Mass. (T)
- Becker, F. H., 72 Murray Ave., Port Washington, L. I., N. Y. (T)
- Becker, F. J., 423 W. Trail St., Jackson, Mich. (T)
- Becker, R., R. F. D. No. 6, Jackson, Mich. (T)
- Beckett, W. A., % Nassau County Police Department, Mincola, N. Y. (P)
- Bedinger, R. D., 1231 Mansfield Ave., N. E., Atlanta, Ga. (T)
- Bech, W. H., Wichita, Kan. (T)
- Behncke, D. L., 542 Lincoln Ave., St. Paul, Minn. (T)
- Belcher, B. F., Service Sq. 1, Aircraft Sqs., ECEF, Quantico, Va. (T)
- Belcher, S. A., % Belcher Asphalt Paving Co., Miami, Fla. (T)
- Bell, C. O., 332 E. Columbia St., Alliance, Ohio (T)
- Bellande, E. A., Rogers Airport, 3901 Angelus Mesa Dr., Los Angeles, Calif. (T)
- Benedict, J. T., 1507 W. 7th St., Sioux City, Iowa (T)
- Bennett, F., 239 Ocean Ave., Brooklyn, N. Y. (T)
- Bennett, G. L., 223 W. 12th St., Kansas City, Mo. (T)
- Bennett, J. C., Jr., 908 19th Ave., S., Nashville, Tenn. (T)
- Bennett, R. L., 229 Court St., Binghamton, N. Y. (T)
- Berns, E., % Toledo Airport, Toledo, Ohio (T)
- Bertelsen, N. W., 111 Court Rd., Winthrop, Mass. (P)
- Bertrandias, V. E., 300 Lonsdale Ave., Dayton, Ohio (T)
- Bevins, O., Pikeville, Ky. (T)
- Biedenmeister, K. A., 431 S. Arlington Ave., Indianapolis, Ind. (T)
- Biffle, I. O., Air Mail Field, Omaha, Neb. (T)
- Billings, A. A., 772 Terrace St., Muskegon, Mich. (P)
- Billings, E. F., 45 Taft Ave., Winthrop, Mass. (T)
- Billiter, E. D., 401 3rd St., Dell Rapids, S. D. (T)
- Bischof, G. F., 2915 W. 7th St., Fort Worth, Tex. (P)
- Bishop, C. C., 1572 West Vernon, Los Angeles, Calif. (LC)
- Bishop, L. F., % Air Mail Sta., Iowa City, Iowa (T)
- Bissell, C., Langley Field, Hampton Roads, Va. (T)
- Bissell, H. P., Mitchel Field, L. I., N. Y. (T)
- Black, E. C., Hdqrs. 3rd Corps Area, Baltimore, Md. (T)
- Black, N., 5943 N. Rockwell, Chicago, Ill. (T)
- Blackard, C. G., 915 Nashville Trust Bldg., Nashville, Tenn. (T)
- Blair, B., Roger's Airport, Santa Barba and Mesa Dr., Los Angeles, Calif. (T)
- Blair, O. L., 4020 N. 6th St., Ft. Smith, Ark. (T)
- Blaufuss, W. B., Langley Field, Hampton Roads, Va. (T)
- Blevins, B., P. O. Box 329, Atlanta, Ga. (T)
- Bockius, R. W., % Navy Department, Washington, D. C. (T)
- Bogart, J. B., 902 W. 3rd, Little Rock, Ark. (T)
- Bogert, H. Z., 328 Oxford Ave., Dayton, Ohio (T)
- Boggs, M. S., 703 Scenic Ave., Piedmont, Calif. (T)
- Boggs, T. G., 116 W. Gorham St., Madison, Wis. (T)
- Bohlman, H. R., 2409 Oswego Ave., Baltimore, Md. (T)
- Bohnke, V. W., 432 N. 2nd St., Decatur, Ind. (T)
- Bondurant, D. S., 1400 Poplar, Cairo, Ill. (T)
- Bonneville, W. H., 1736 G. St., N. W., Washington, D. C. (P)

- Bonney, L. W., 127 Jamaica Ave., Flushing, N. Y. (P)
- Boone, D. L., 2330 Harrison St., Kansas City, Mo. (T)
- Boonstra, H. G., 295 N. Main St., Salt Lake City, Utah (T)
- Boots, F. J., 316 2nd Ave., N. W., Oelwein, Iowa (T)
- Borden, A., 5 Nassau St., New York, N. Y. (P)
- Borke, E. T., 2678 Pierce St., Detroit, Mich. (T)
- Borne, A. R., 4473 W. 28th St., Los Angeles, Calif. (T)
- Boston, R. W., 1933 W. 54th St., Los Angeles, Calif. (P)
- Bott, F. J., 1826 Delevan Ave., Lansing, Mich. (LC)
- Boudwin, J. E., Jr., 2110 19th St., N. W., Washington, D. C. (T)
- Bourdon, A. P., Dennison Aircraft Corp., Atlantic, Mass. (T)
- Bourne, T. B., % Airways Div., Hurley-Wright Bldg., Washington, D. C. (T)
- Bowen, L. L., R. 5, South Omaha, Neb. (T)
- Bowen, W. E., 18th Broadway, Council Bluffs, Iowa (P)
- Bowhan, F. D., Cessna Aircraft Co., Wichita, Kan. (T)
- Bowlin, W. M., Naval Air Sta., Hampton Roads, Va. (T)
- Bowman, C. R., 4426 6th Ave., Los Angeles, Calif. (T)
- Bowman, J. W., Mitchel Field, Garden City, N. Y. (T)
- Boyd, P. M., % Curtiss A. & Motor Co., Garden City, N. Y. (T)
- Brabston, K. D., 4329 Overlook Rd., Birmingham, Ala. (T)
- Bradbury, L. T., 287 Kennebec Ave., Long Beach, Calif. (P)
- Braddick, C. H., 210 1st Nat'l Bank Bldg., Denver, Colo. (T)
- Bradford, W. H., Palwaukee Air Port, Mt. Prospect, Ill. (T)
- Bradley, F. A., 15714 Turlington Ave., Harvey, Ill. (T)
- Bradshaw, L. L., Langley Field, Va. (T)
- Brady, F. M., Langley Field, Va. (T)
- Bragunier, C., % Los Angeles Airport, Los Angeles, Calif. (T)
- Bratley, T. L., 2411 E. Douglas, Wichita, Kan. (T)
- Brandon, J. L., Stout Air Services, Dearborn, Mich. (T)
- Brandon, M. Z., Jr., Brandon, Fla. (LC)
- Braniff, P. R., % T. E. Braniff Co., Oklahoma City, Okla. (T)
- Braukman, C. A., 1416 So. Emerson, Denver, Colo. (T)
- Brayton, C. E., Anglum, Mo. (T)
- Breene, R. G., McCook Field, Dayton, Ohio (T)
- Breeze, V., 270 7th St., San Francisco, Calif. (T)
- Brenneman, C. G., 41 St. Capitol Bldg., Denver, Colo. (T)
- Brewster, III, B. H., 25 S. Calvert St., Baltimore, Md. (P)
- Brewster, H., 8114 Courtland Ave., Dallas, Tex. (T)
- Brierly, H. E., 1914 Park Pl., Wichita, Kan. (T)
- Brimm, D. J., Jr., P. O. Box 311, Garden City, N. Y. (LC)
- Briney, W. M., % Kansas City Journal Post, Kansas City, Mo. (T)
- Brink, L. P., Waverly, N. Y. (T)
- Brinton, H. R., 34 Maple Ter., West Springfield, Mass. (P)
- Brock, J. D., 1099 McGee St., Kansas City, Mo. (T)
- Brock, M., P. O. Box 1215, Wichita Falls, Tex. (T)
- Brock, W. S., % Dodgson Motor Co., 802 Lafayette Bldg., Detroit, Mich. (T)
- Brockenbrough, E. H., 211 N. Blount St., Raleigh, N. C. (T)
- Bronte, E. B., 2716 Webster St., San Francisco, Calif. (P)
- Brooke, W. A., 3515 Enslow Ave., Richmond, Va. (T)
- Brookley, W. H., Brooks Field, San Antonio, Tex. (T)
- Brooks, A. R., Airways Division, Dept. of Com., Washington, D. C. (T)
- Brooks, H. C., R. F. D. "C," Box 108-G, Indianapolis, Ind. (T)
- Brooks, H. J., Ford Airport, Dearborn, Mich. (T)
- Brooks, R. M., 624 N. Texas Bldg., Dallas, Tex. (I)
- Brooks, R. L., 370 Park Ave., New York, N. Y. (T)
- Brower, G. E., Wright Field, Dayton, Ohio (T)
- Brown, A. C., Mt. Vernon, Ill. (T)
- Brown, C. W., Box 1870, Route 9, Detroit, Mich. (T)
- Brown, E. R., Box 58, Columbia, Ga. (T)
- Brown, H. J., Air Mail Field, Cleveland, Ohio (T)
- Brown, J. H., Hopewell Air Lines, 1001 Broadway, Hopewell, Va. (LC)
- Brown, M., 2124 Hyde St., San Francisco, Calif. (T)
- Brown, R., Ireland Aircraft, Curtiss Field, Garden City, N. Y. (P)
- Brown, S. W., Edgewood Arsenal, Edgewood, Md. (T)
- Browne, N. C., 237 Monroe St., Dearborn, Mich. (T)
- Browning, R. M., 805 Travis St., Wichita Falls, Tex. (LC)
- Buck, J. A., 701 Van Buren St., Wilmington, Del. (T)
- Bucklen, R. C., 4708 Calaveras Ave., Oakland, Calif. (P)
- Buckner, C. G., P. O. Box 208, Hotel Fresno, Calif. (T)
- Buckner, H. E., 1227 Fulton St., San Francisco, Calif. (T)
- Budwig, G. G., 1016 N. Central Ave., Glendale, Calif. (T)
- Bullock, E. W., 1801 15th Ave., S., Birmingham, Ala. (T)
- Bullock, H., 74 Grant St., Cohoes, N. Y. (P)
- Bullock, W. R., 1219 Second Ave., So., Minneapolis, Minn. (T)
- Bunge, W. O., Langley Field, Va. (T)
- Burdich, W. E., East Russel St., Monroe, Wis. (LC)
- Burford, D. W., Ford Airport, Dearborn, Mich. (T)
- Burgin, E. H., 557 Academy St., New York, N. Y. (T)
- Burke, W. A., Okmulgee, Okla. (T)
- Burley, B. D., 1518 Hyde Park Blvd., Chicago, Ill. (T)
- Burnham, A. L., 31 Mortson St., Hartford, Conn. (P)
- Burnham, C. E., 1631 Avenue E., Council Bluffs, Iowa (T)

- Burns, A. C., 1438 Canfield Ave., Los Angeles, Calif. (T)
- Burns, G. E., 2800 W. Grand Blvd., Detroit, Mich. (T)
- Burns, J. H., P. O. Box 225, Hapeville, Ga. (T)
- Burnside, F. H., U. S. Air Mail, Cleveland, Ohio (T)
- Burns, R. P., 3945 W. Natchez Ave., Chicago, Ill. (T)
- Burrows, C. A., 282 Vallejo Drive, Glendale, Calif. (T)
- Burrows, R. C. Liberal, Kan. (T)
- Burwell, H. B. S., Bolling Field, Anacostia, D. C. (T)
- Burwell, P. V., 101 Norwood Rd., Baltimore, Md. (T)
- Bushing, F. H., 1206 10th St., N. W., Washington, D. C. (T)
- Butler, E. A., 479 Wyoming Ave., Buffalo, N. Y. (P)
- Butterfield, H. B., VT Sqd. ONE-S, Fleet Air Base, Hampton Roads, Va. (T)
- Buzzi-Gradenigo, C., Ambassador Hotel, Los Angeles, Calif. (P)
- Byerley, F., Ouachita Parish Health Unit, Monroe, La. (LC)
- Byrne, P. J., U. S. Navy Air Station, Hampton Roads, Va. (T)
- Caffarello, J. M., 846 W. Austin Ave., Chicago, Ill. (LC)
- Caffarello, M. A., 846 W. Austin Ave., Chicago, Ill. (LC)
- Caldwell, C. C., % F. A. Tichenor, Aero Digest, 220 W. 42nd St., New York, N. Y. (T)
- Caldwell, G. Q., Airport, Little Rock, Ark. (P)
- Campbell, E. K., 515 18th St., Moline, Ill. (T)
- Cameron, C. J., 4471 Garland Ave., Detroit, Mich. (T)
- Cameron, D. A., 1441 Lakewood Ave., Detroit, Mich. (LC)
- Campbell, M. H., 600 Central Ave., Alameda, Calif. (T)
- Campion, J. L., Box 614, R. R. No. 1, Clayton, Mo. (T)
- Canfield, E. M., 25 9th St., North Fargo, N. D. (T)
- Cannon, W. D., Jr., Clover Field, Santa Monica, Calif. (T)
- Cantwell, R. W., 1704 W. 23rd St., Oklahoma City, Okla. (T)
- Caperton, A. L., Curtiss Flying Serv., Inc., Garden City, N. Y. (T)
- Carey, W. E., 2344 W. 31st St., Los Angeles, Calif. (T)
- Carlson, C. R., 4424 N. 24th St., Omaha, Neb. (P)
- Carlson, L. D., Stromsburg, Neb. (T)
- Carlson, T. R., 116½ N. Cherokee St., Muskogee, Okla. (LC)
- Carothers, L., Cedar Rapids, Iowa (T)
- Carpenter, B. A., % Huff Daland Dusters, Monroe, La. (T)
- Carpenter, P. L., Alexander Aircraft Co., Denver, Colo. (P)
- Carr, W. J., 301 N. Hamilton St., Saginaw, Mich. (T)
- Carroll, T., 410 Mallory Ave., Hampton, Va. (T)
- Carson, I. F., 3100 Garland Ave., Richmond, Va. (T)
- Carter, A. (Buck), 507 E. Hillsboro, El Dorado, Ark. (T)
- Cary, G. S., R. F. D. No. 3, Torrington, Conn. (P)
- Casey, J. F., Shrewsbury, N. J. (T)
- Cassidy, W. P., 236 W. Flagler St., Miami, Fla. (T)
- Cavender, La P., 4639 Magnolia Ave., Chicago, Ill. (T)
- Center, F., 2193 S. Clarkson St., Denver, Colo. (LC)
- Centner, W. F., 249 E. Rich St., Columbus, Ohio (T)
- Chadwick, S., R. F. D. No. 2, Freehold, N. J. (T)
- Chalk, A. B., 368 N. E. 57th St., Miami, Fla. (T)
- Chamberlain, C. B., Plaza Hotel, Milwaukee, Wis. (T)
- Chamberlin, C. D., Hasbrouck Heights, N. J. (T)
- Chandler, E. W., 270 W. 38th St., Fairchild Flying Corp., New York, N. Y. (T)
- Chandler, H. S., Colonial Air Transport Co., Boston Airport, Boston, Mass. (LC)
- Chapman, G. F., 7 Chipman, Dorchester, Mass. (T)
- Chappell, E. E., 1034 Gas & Elec. Bldg., Denver, Colo. (LC)
- Chard, G. F., 843 N. Mapleton Ave., Oak Park, Ill. (LC)
- Charles, C. A., 3100 Wisconsin Ave., N. W., Washington, D. C. (T)
- Charles, J. S., 3100 Garland Ave., Richmond, Va. (T)
- Chase, E. M., 432 S. St. Louis St., Tulsa, Okla. (T)
- Chase, F. H., 55 Washington Ave., Chelsea, Mass. (P)
- Chase, L., 339 Highgate Ave., Buffalo, N. Y. (T)
- Chienault, C. L., 604 Baylor St., San Antonio, Tex. (T)
- Chester, A. C., 254 Giertz Ave., Downers Grove, Ill. (T)
- Choate, R. E. L., Maxwell Field, Montgomery, Ala. (LC)
- Christen, V. D., 1025 S. Freedom Ave., Alliance, Ohio (P)
- Christenson, C., 479 S. East 30th St., Des Moines, Iowa (LC)
- Christopher, L., Huff Daland Airplanes, Bristol, Pa. (T)
- Clark, C. E., Travel Air Mfg. Co., Inc., Wichita, Kan. (T)
- Clark, F. V., USNAS, Pensacola, Fla. (T)
- Clark, G. O., Spencerport, N. Y. (T)
- Clark, P. G., 1824 N. Nevada, Colorado Springs, Colo. (P)
- Clarke, F., 1949 Tamarind Ave., Hollywood, Calif. (T)
- Cleveland, J. D., Cadet Detachment, Kelly Field, Tex. (T)
- Clevenger, C. P., % Alexander Aircraft Co., Denver, Colo. (T)
- Clifford, C. W., 119 Spring St., Battle Creek, Mich. (T)
- Cline, D. G., Air Mail, Hadley Field, New Brunswick, N. J. (T)
- Close, M. W. C., E. 829 Indiana Ave., Spokane, Wash. (P)
- Clothier, D., Grand Rapids Air Port, R. F. D. No. 10 (T)
- Cloukey, M. M., VT Sqd. ONE-S, Fleet Air Base, Hampton Roads, Va. (T)
- Cobb, G. W., P. O. Box 3608, Miami, Fla. (T)
- Cochrane, R. M., 702 W. Camilla St., Whittier, Calif. (T)
- Coffman, S. H., Clinton, Okla. (T)
- Cogswell, S. W., P. O. Box 220, Port Washington, L. I., N. Y. (T)

- Cole, F. M., U. S. Geological Survey, Box 428, Midwest, Wyo. (T)
- Cole, K. R., 16800 St. Clair Ave., Cleveland, Ohio (T)
- Coleman, C. R., Pitcairn Aviation, Inc., Richmond, Va. (P)
- Collings, J. A., Ford Airport, Dearborn, Mich. (T)
- Collins, P. F., Cleveland Airport, Cleveland, Ohio (T)
- Collison, H. A., 301 E. 1st Ave., Cheyenne, Wyo. (T)
- Collyer, C. B. D., Skywriting Corp. of America, 50 E. 42nd St., New York, N. Y. (T)
- Comp, H. O., R. T. Flying Service, P. O. Box 1969, Richmond, Va. (T)
- Compton, S., 2975 Illinois St., Fresno, Calif. (T)
- Condit, C. L., 608 S. Dearborn St., Chicago, Ill. (T)
- Cone, J. C., No. 2 Alpine Court, Little Rock, Ark. (T)
- Conerton, E. H., Aeronautics Br., Dept. of Commerce, Washington, D. C. (T)
- CConnell, L. H., 804 Robinson Ave., Conway, Ark. (T)
- Connell, S. M., Brooks Field, San Antonio, Tex. (T)
- Conrad, G. V., Dodd Hall, Langley Field, Va. (T)
- Cooke, W. R., 333 Canon Drive, Beverly Hills, Calif. (T)
- Coombs, C. B., 708 Law Bldg., Norfolk, Va. (T)
- Cooper, B. S., Vance Air Service, Great Falls, Mont. (T)
- Cooper, I. M., % C. W. Hunter, Millersburg, Pa. (T)
- Cooper, J. H., Hilton, N. Y. (T)
- Copland, H. D., 1478 Boulevard Ave., West Hartford, Conn. (T)
- Copsey, R. L., Thermopolis, Wyo. (T)
- Coray, F. M., R. F. C. No. 2, Box 48, Ventura, Calif. (T)
- Corben, O. G., 840 Eastwood Ave., Chicago, Ill. (P)
- Cordner, J. H., Air Mail Field, Denver, Colo. (T)
- Cordova, F., 55 Hanson Pl., Brooklyn, N. Y. (LC)
- Cornell, H. E., Winter Haven, Fla. (I)
- Coulter, R. E., Van Wert, Ohio (T)
- Coulter, T. B., 2013 Walgrove Ave., Venice, Calif. (T)
- Couples, E., 566 Ontario St., Lima, Ohio (LC)
- Coyle, O. W., 4625 Utah St., San Diego, Calif. (T)
- Craig, T. P., R. F. D. No. 34, Pittsville, Mo. (T)
- Craine, J. H., Langley Field, Va. (T)
- Cramer, P. D., Aeronautics Br., Dept. of Com., Washington, D. C. (T)
- Crawford, H., Kunkle, Ohio (P)
- Crawford, R. C., 710 E. 5th St., Long Beach, Calif. (T)
- Creighton, B. H., 901 Spottswood Ave., Norfolk, Va. (T)
- Cronk, H. M., 1st Lt., 2216 Main St., Little Rock, Ark. (T)
- Cross, J. M., 1753 N. Holyoke St., Wichita, Kan. (I)
- Crosson, J. E., Fairbanks, Alaska (T)
- Cummings, C. M., Cleveland Airport, Cleveland, Ohio (T)
- Cunningham, C. C., 24 E. Michigan St., Indianapolis, Ind. (T)
- Curtin, L. W., Wardman Park Hotel, Washington, D. C. (T)
- Cushing, G. R., P. O. Box 143, Roslyn, Pa. (P)
- Cutrell, E. A., 4946 W. 15th St., Speedway City, Indianapolis, Ind. (T)
- Cutter, W. P., Box 1145, Casper Wyo. (LC)
- Dahllem, L. A., 1454 W. Lake St., Minneapolis, Minn. (T)
- Dake, R. E., 1355 Cordova Rd., Pittsburgh, Pa. (T)
- Dallas, C., 367 Parker Ave., Buffalo, N. Y. (P)
- Dallin, V., 660 Fern St., Landsdowne, Pa. (T)
- Danforth, C. H., Hdqrs. 4th Corps Area, Ft. McPherson, Ga. (T)
- Darby, D. W., 350 N. Highland Ave., Merion Sta., Pa. (P)
- Dargue, H. A., 4500 Klinge St., N. W., Washington, D. C. (T)
- Daugherty, E. S., 2495 Pine Ave., Long Beach, Calif. (T)
- Datin, F. E., 2031 Central Ave., Memphis, Tenn. (T)
- Davies, I., Richards Field, Kansas City, Mo. (T)
- Davies, J. M., Chanute Field, Rantoul, Ill. (T)
- Davies, W. J., 21 West, Langley Field, Hampton Roads, Va. (T)
- Davis, A. J., Box 914, East Lansing, Mich. (T)
- Davies, D. H., 1018 Byron Dr., Atlanta, Ga. (T)
- Davis, F. E., Norton Field, Columbus, Ohio (T)
- Davis, J. C., 204 Cotton Exchange Bldg., Houston, Tex. (T)
- Davis, I. D., 3726 Beechmont Ave., Cincinnati, Ohio (T)
- Davis, O. L., 5552 Sansom St., Philadelphia, Pa. (P)
- Davis, W. C., 350 B, San Mateo, Calif. (P)
- Davison, A. S., Ralston Ave., Belmont, Calif. (P)
- Day, E. W., Jr., 1249 N. Highland Ave., Pittsburgh, Pa. (T)
- Day, R. M., 102 Cass St., Arcade, Tampa, Fla. (T)
- Day, W. B., % Third Nat'l Bank Bldg., Springfield, Mass. (P)
- de Arce, L. P., % Boston Art Club, Boston, Mass. (T)
- Deets, S., 221 S. Sycamore, North Platte, Neb. (T)
- De Cecca, J., 4512 259th St., Little Neck, L. I., N. Y. (LC)
- Decker, K., 253 W. Santa Barbara Ave., Los Angeles, Calif. (T)
- Deeds, E. F. M., 508 Bank Italy Bldg., Visalia, Calif. (T)
- DeGarmo, A. R., % Western Air Express, Inc., 113 W. 9th St., Los Angeles, Calif. (T)
- DeHaven, R. J., 1219 Alcott Ave., Kalamazoo, Mich. (LC)
- De Lasaux, C. F., 7125 S. Western Ave., Los Angeles, Calif. (T)
- DeMott, J. H., 312 S. Lakeside Court, West Palm Beach, Fla. (T)
- Dempsey, E. A., 1117 Cass Ave., St. Louis, Mo. (T)
- Demshock, J. J., Apt. 6A, Pocahontas St., Hampton Roads, Va. (T)
- DeNoya, H. V., 2 Berthe Circle, Colorado Springs, Colo. (P)

- Depew, R. H., Jr., 270 W. 38th St., New York, N. Y. (T)
- DeRenzo, E. M., 1528 Chestnut St., San Francisco, Calif. (P)
- de Rose, R. M., 4911 Diaz Ave., Van Nuys, Calif. (T)
- Derham, J. E., Jr., 526 Post St., San Francisco, Calif. (P)
- Derryberry, L. E., 314 Alexander Bldg., Abilene, Tex. (T)
- Descomb, C., 14 Lisbon St., Hartford, Conn. (LC)
- DeSchepper, G., 515 18th St., Moline, Ill. (LC)
- Despain, L. N., 1986 S. 6th East St., Salt Lake City, Utah (LC)
- de Spoelberch, V. E., 1612 Locust St., Philadelphia, Pa. (P)
- Detmer, E. J., 192 Benedict Ave., Tarrytown, N. Y. (T)
- Devaney, L. G., 800 E. Hoyt, Portland, Ore. (T)
- Devereaux, E. J., 10930 122nd St., Richmond Hill, N. Y. (LC)
- Devery, J. J., Jr., Chanute Field, Rantoul, Ill. (T)
- DeVore, R. R., Box 725, Clearwater, Fla. (T)
- DeVries, W. H., 726 N. Van Buren, Stockton, Calif. (T)
- DeWald, W. N., 106 W. 47th St., New York, N. Y. (T)
- DeWitt, A. H., Box 214, Frankfort, Ind. (T)
- Dexter, J. F., 605 N. Texas Blvd., Dallas, Tex. (P)
- Dexter, J. S., 535 Beacon St., Boston, Mass. (T)
- Dice, F. O., 909 Converse Ave., East St. Louis, Ill. (T)
- Dice, L. H., 3815 Boarman Ave., Baltimore, Md. (T)
- Dichman, E. W., McCook Field, Dayton, Ohio (T)
- Dick, R. J., % Richards Field, Kansas City, Mo. (T)
- Dickenson, J. M., Box 409, Coffeyville, Kan. (P)
- Dickins, G. R., 4519 Fernhill Road, Philadelphia, Pa. (T)
- Dickinson, E. M., % Sikorsky Mfg. Corp., College Point, L. I., N. Y. (P)
- Dickson, J. B., Langley Field, Va. (T)
- Diegel, D., 1264 S. High St., Denver, Colo. (T)
- Deitrich, E., 719 St. Nicholas Ave., Dayton, Ohio (P)
- DiFiore, D. A., 467 Lagunitas Ave., Oakland, Calif. (T)
- Diggle, B. W., 321 W. Armour, Kansas City, Mo. (T)
- Dinger, H. A., Bolling Field, Washington, D. C. (T)
- Ditter, F. J., 1400 Guard Ave., N. Minneapolis, Minn. (P)
- Dixon, C. A., Brainard Field, Hartford, Conn. (T)
- Doak, C. D., 3148 Indianapolis Ave., Indianapolis, Ind. (T)
- Dobie, R. L., 2441 E. 67th St., Terrace, Kansas City, Mo. (T)
- Dodd, W. C., 1819 W. Pershing Road, Chicago, Ill. (T)
- Dodson, R. B., 512 S. Cottage Grove Ave., Kirksville, Mo. (T)
- Donaldson, H. G., 1409 Boren Ave., Seattle, Wash. (T)
- Donnellan, J. F., St. Joseph, Mich. (T)
- Dooley, K. J., Stinson Field, South Loop Rd., San Antonio, Tex. (T)
- Dooley, L. E., Anglum, Mo. (T)
- Doolin, B. M., 449 Bryant St., San Francisco, Calif. (T)
- Doolittle, J. H., McCook Field, Dayton, Ohio (T)
- Dorr, H. W., Mitchel Field, L. I., N. Y. (T)
- Dottenveich, J. H., 36 Brunswick Blvd., Buffalo, N. Y. (P)
- Doty, D. E., South Alameda, Calif. (T)
- Doty, P. B., 879 S. Vine, Denver, Colo. (P)
- Douglas, J. F., 601 E. Kyger St., Frankfort, Ind. (T)
- Douglas, J. H., 511 2nd Ave., S., Nashville, Tenn. (T)
- Dowling, C. E., 1024 Oxford St., Berkeley, Calif. (T)
- Doyle, H. C., 83 23rd St., Jackson Heights, L. I., N. Y. (T)
- Drasgow, R. J., 197 Highgate St., Buffalo, N. Y. (P)
- DuBose, S. C., 1135 Morton St., Alameda, Calif. (T)
- Dudley, L. M., 1123 Sonoma St., Vallejo, Calif. (T)
- Duffy, N. E., 449 Bird Ave., Buffalo, N. Y. (P)
- Duke, D., Bolling Field, Anacostia, Washington, D. C. (T)
- Duncan, P. B., 2820 Arlington Ave., Lincoln, Neb. (LC)
- Dunlop, W. G., 917 E. 18th St., Winston Salem, N. C. (T)
- Dunn, F. T., 4755 Lindell Blvd., St. Louis, Mo. (T)
- du Pont, A. F., Jr., Kennett Pike, Wilmington, Del. (P)
- DuPont, H. B., DuPont Bldg., Wilmington, Del. (T)
- Durfee, T., % M. D. Champlin, 616 Turks Head Bldg., Providence, R. I. (T)
- Eaker, I. C., 401 23rd St., N. W., Washington, D. C. (T)
- Eaton, J. L., 17 Miller Ave., Sausalito, Calif. (T)
- Eberle, P., 807 Oakwood Blvd., Royal Oak, Mich. (T)
- Ebrite, A. R., 311 W. Ninth St., Long Beach, Calif. (T)
- Edgar, P., Grand Blvd., Tarpon Springs, Fla. (P)
- Edgar, R. E., 1738 Wood Ave., Colorado Springs, Colo. (LC)
- Edson, A. L., 15 King Oak Terrace, Weymouth Heights, Mass. (T)
- Eielson, C. B., Hatton, N. D. (T)
- Elder, R., Garden City Hotel, Long Island, Ellers, L. N., 331 Washington, St., Hartford, Conn. (T)
- Elie, L. T., 224 E. 11th St., Los Angeles, Calif. (P)
- Elie, N. Y. (P)
- Elliott, H. A., Pitcairn Aviation, 1830 Land Title Bldg., Philadelphia, Pa. (T)
- Elliott, H. E., 715 Quachita Nat'l Bank Bldg., Monroe, La. (T)
- Ellis, R. H., U. S. Air Mail Service, Salt Lake City, Utah (T)
- Elsmore, R. T., 1898 S. 13th East St., Salt Lake City, Utah (T)
- Embry, T. H., Lunken Airport, Cincinnati, Ohio (T)
- Emerson, G. W., 342 Granite Bldg., Rochester, N. Y. (T)
- Emrick, H. H., Buhl Aircraft Co., Marysville, Mich. (T)

- Enderton, O., 1055 Genesee St., Rochester, N. Y. (T)
 England, W. L., 764 C. Y. Ave., Casper, Wyo. (P)
 Ennis, A. L., Rm. 1060 Munitions Bldg., Washington, D. C. (T)
 Ennis, W. K., 504 Avondale Ave., Houston, Tex. (LC)
 Enslow, R. S., 739 Genesee St., Rochester, N. Y. (T)
 Enzminger, L., 317 S. Sycamore St., North Platte, Neb. (T)
 Erhardt, A. F., 5 Liberty St., Hempstead, N. Y. (P)
 Ervin, R. G., 242 State War and Navy Bldg., Washington, D. C. (T)
 Erwin, W. P., Box 1672, Dallas Tex. (T)
 Esslinger, R. L., Hicksville, L. I., N. Y. (T)
 Eiten, H. C., 626 Federal St., Chicago, Ill. (T)
 Eubank, E. L., McCook Field, Dayton, Ohio (T)
 Evans, N. B., 643 Overton St., Portland, Ore. (T)
 Ewing, E. E., 327 N. Logan St., Colorado Springs, Colo. (P)
 Fagan, E. M., Jr., 3818 W. 14th St., Little Rock, Ark. (T)
 Fahy, H. J., 1012 20th St., N. W., Washington, D. C. (T)
 Fairchild, M. S., Langley Field, Va. (T)
 Fales, H. G., 145 Highland St., West Newton, Mass. (T)
 Farran, D., Crissy Field, Presidio of San Francisco, Calif. (T)
 Farris, F. W., 2231 Alma St., San Pedro, Calif. (T)
 Faser, C., Jr., Monroe, La. (P)
 Fatt, R. H., Jr., 6324 Montgall Ave., Kansas City, Mo. (T)
 Faulkner, C. J., 477 N. W. 5th St., Miami, Fla. (T)
 Faulkner, J. B., Willow Grove, Pa. (T)
 Faurot, L. C., R. D. 5, Wilksburg, Pa. (T)
 Faw, G. W., El Paso Flying Ser., Hotel McCoy, El Paso, Tex. (T)
 Feery, J. J., 500 Chamber of Commerce Bldg., Pittsburgh, Pa. (T)
 Fetterman, O. Y., 1110 Moncado, St., Glendale, Calif. (P)
 Fettes, T. M., Box 1062, Oxnard, Calif. (T)
 Field, R., 1269 Alwidy Ave., Dayton, Ohio (T)
 Fife, J. A., 2045 Rehman St., Pittsburgh, Pa. (T)
 Fillman, F., Gardner, Ill. (P)
 Fillmore, W. H., 12 Sierra Ave., Piedmont, Calif. (T)
 Fisher, A. L., 1626 6th Ave., Los Angeles, Calif. (T)
 Fisher, J. F., 1908 Louisiana Ave., St. Louis, Mo. (P)
 Fitzgerald, G. R., % Airways Div. Bu. of Lighthouses, Hurley-Wright Bldg., Washington, D. C. (T)
 Fitzmaurice, J. M., Chanute Field, Rantoul, Ill. (T)
 Flagg, A. P., Navy Department, Washington, D. C. (T)
 Flanagan, L., 405 W. Seventy-first St., Los Angeles, Calif. (T)
 Fleet, E. W., 24 Newplace St., Yalesville, Conn. (T)
 Fleet, R. H., 2050 Elmwood Ave., Buffalo, N. Y. (T)
 Flewellin, L. T., 31 Davis Ave., White Plains, N. Y. (LC)
 Flo, L. S., Wolverine Hotel, Detroit, Mich. (T)
 Flournoy, J. J., 427 N. Yale, Wichita, Kan. (T)
 Flynn, E. J., 66 Seaview Ave., Ocean View, Norfolk, Va. (T)
 Flynn, F. A., 404-5 Balboa Bldg., San Francisco, Calif. (LC)
 Fogg, M. L., Ft. Lauderdale, Fla. (T)
 Fogg, R. S., 16 Westbourne Rd., Concord, N. H. (T)
 Ford, C. W., 144 Clark St., Newton Center, Mass. (T)
 Forshay, H. J., 415 Alameda Pl., Dayton, Ohio (T)
 Foster, J. O., 1336 Bush Blvd., Birmingham, Ala. (P)
 Fowler, S. P., Memphis, Mo. (T)
 Fox, H., American Nat'l Bank, Nashville, Tenn. (T)
 Fox, R. D., 925 1/2 St. James St., Pittsburgh, Pa. (P)
 France, C. W., 1011 E. 17th Ave., Denver, Colo. (T)
 Francis, G. W., 2018 Francis Ave., Flint, Mich. (T)
 Francisco, W. H., Langley Field, Va. (T)
 Frantz, H. G., 219 Cheyenne Rd., Colorado Springs, Colo. (P)
 Frappier, J., 808 Madison Ave., Toledo, Ohio (T)
 Fredeman, F. H., 1518 Welch St., Little Rock, Ark. (P)
 Frederick, L. D., Chanute Field, Rantoul, Ill. (T)
 Freeburg, M. B., 2911 W. 44th St., Minneapolis, Minn. (T)
 Freeman, J. G., 2715 Wood Ave., Colorado Springs, Colo. (P)
 French, A. R., 461 E. Washington St., Portland, Ore. (T)
 French, H. W., North Beach, Md. (T)
 French, R. A., 725 10th St., Wichita Falls, Tex. (T)
 Freng, R. T., Boeing Air Transport, Salt Lake City, Utah (T)
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 Holterman, E. H., Woodstock, Vt. (T)
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- Hublitz, H. P., % W. E. Thompson, Harvey Bldg., W. Palm Beach, Fla. (T)
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- Hudson, R. E., % Buhl Aircraft Co., Marysville, Mich. (T)
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- Huffman, S. C., The Embury-Riddle Co., Lunken Airport, Cincinnati, Ohio. (T)
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- Laughlin, H. V., 89 N. 18 St., Portland, Ore. (T)
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- Lawrence, J. M., 701 6th St., St. Joseph, Mo. (T)
- Lawson, L. F., R. F. D. No. 2, Arkansas City, Kan. (T)
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- LeBoutillier, O. C., 122 Prospect St., East Orange, N. J. (T)
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- Lee, J. A., Air Corps Tactical School, Langley Field, Hampton Roads, Va. (T)
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- Leedy, W. E., Jr., 230 Brockwood Ave., Youngstown, Ohio (LC)
- Lees, R., Aeronautics Br., Dept. of Com., Washington, D. C. (T)
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- Leitch, A., 112 Mid-Co. Bldg., Tulsa, Okla. (P)
- Lemcke, H. McM., Hotel Stewart, San Francisco, Calif. (T)
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- Lindbergh, C. A., % Robertson Aircraft Corp., Anglum, Mo. (T)
- Lindquist, G. C., Chicago Flying Club, Chicago, Ill. (LC)
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- Little, H. P., 909 Calumet Ave., Hammond, Ind. (T)
- Little, R. J., 665 Sutter St., San Francisco, Calif. (T)
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- Longfellow, N., Mitchel Field, Long Island, N. Y. (T)
- Loutzenheiser, J. L., Chanute Field, Rantoul, Ill. (T)
- Love, P. R., Anglum, Mo. (T)
- Lovejoy, K. F., 5437 Ellsworth Ave., Pittsburgh, Pa. (T)
- Lott, E. P., 921 Bell Ave., La Grange, Ill. (T)
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- Lyster, A. P., National Park, N. J. (LC)
- McAvoy, W. H., Langley Field, Va. (N. A. C. A.) (T)
- McBride, C. J., 4537 Spruce St., Philadelphia, Pa. (P)
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- McCaffrey, H. F., 96 S. Linwood Ave., Crafton, Pa. (T)
- McCallill, F. T., 730 McKnight Bldg., Minneapolis, Minn. (P)
- McCallum, D., Bowman Field, Jefferstown, Ky. (T)
- McCauley, D. R., Chesapeake City, Md. (T)
- McClellan, S. A., Pratt & Whitney Aircraft, Hartford, Conn. (T)
- McConaughy, I. M., McClellan Hotel, Wichita, Kan. (T)
- McConnell, F. B., 1304 16th Ave., S., Nashville, Tenn. (T)
- McConnell, G. E., Miami Aircraft Co., Miami, Okla. (T)
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- McDonnell, J. S., Jr., 1700 Humboldt Blvd., Milwaukee, Wis. (T)
- McElheny, P., Mars, Pa. (P)
- McFall, W. P., Midwest Aircraft Corp., St. Cloud, Minn. (T)
- McGee, H. W., Park Ave. West, Terrace Park, Ohio (T)

- McGinn, L. J., 14 Linerty St., Berea, Ohio (T)
- McGinness, L. S., Reynolds Airways, Inc., Hadley Airport, New Brunswick, N. J. (T)
- McHugh, J. B., Brown Field, Quantico, Va. (T)
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- Mackenzie, A. B., 198 E. 52d North, Portland, Ore. (T)
- Mackiewicz, A., 4400 W. 83th St., Chicago, Ill. (T)
- MacPeak, S. H., 504 14th St. N. W., Mason City, Iowa (P)
- Madison, C. A., 205 W. 5th St., North Little Rock, Ark. (P)
- Magruder, W. H., 1415 W. Mistletoe, San Antonio, Tex. (I)
- Maibucher, F. J., 3640 Fountain St., Indianapolis, Ind. (T)
- Major, R. W., 60 Rea St., Lowell, Mass. (P)
- Malick, E. C., 1924 Mt. Vernon St., Philadelphia, Pa. (T)
- Mallenne, V., Love Field, Dallas, Tex. (T)
- Mallette, H. B., 507 Locust St., Sterling, Ill. (T)
- Malone, A. J. K., Langley Field, Va. (T)
- Mamer, N. B., 1312 W. Broadway, Spokane, Wash. (T)
- Mann, M. D., 7759 Constance Ave., Chicago, Ill. (T)
- Manning, L., 233 Monroe Blvd., Dearborn, Mich. (T)
- Manor, F. F., 558 Jackson Dr., Oshkosh, Wis. (P)
- March, C. W., 515 E. 266 St., Wickcliffe, Ohio. (T)
- Maris, C. W., 114 E. 5th St., Flint, Mich. (T)
- Maroney, E. S., Air Mail Field, Rock Springs, Wyo. (T)
- Maross, A., Jr., 22 E. 24th St., Chicago Heights, Ill. (T)
- Marshall, G. A., 76 N. Evergreen St., Memphis, Tenn. (LC)
- Marshall, T., Cleveland Airport, Cleveland, Ohio (T)
- Martin, D. C., Hartsville, S. C. (T)
- Martin, J. E., 402 Oakhurst Dr., Beverly Hills, Calif. (T)
- Martin, K. R., 441 E. Page St., St. Paul, Minn. (LC)
- Martin, R. W., 1502 55th Ave., Oakland, Calif. (T)
- Masson, C. A., 305 Stewart Bldg., Baltimore, Md. (T)
- Mason, C. F., 201 Pierce St., Clearwater, Fla. (P)
- Massey, L., 1203 Wilmington Ave., Richmond, Va. (T)
- Mather, O. M., Station 19, Windsor, Conn. (T)
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- Matthews, W. T., 317 Second St., Marietta, Ohio. (T)
- Matucha, E., P. O. Box 6817, P. K. W. Y. Station, Kansas City, Mo. (T)
- Maus, W. C., Stinson Field, San Antonio, Tex. (T)
- Maxson, L. J., Naval Aircraft Factory, Navy Yard, Philadelphia, Pa. (T)
- Maycock, W. B., 12945 Montrose Ave., Detroit, Mich. (T)
- Mead, H. S., Box 528 San Jose Airport, San Jose, Calif. (LC)
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- Meadow, E. L., Cadet Detachment, Kelly Field, San Antonio, Tex. (I)
- Meadow, L. W., 8110 Walker Ave., Birmingham, Ala. (T)
- Medaris, L. N., Aircraft Squadrons, E. C. E. F., MB, Quantico, Va. (T)
- Meguire, C. O., Lunken Airport, Cincinnati, Ohio. (P)
- Meier, L. A., Jr., 73 Langdon Pl., Lynbrook, L. I., N. Y. (T)
- Meisenheimer, G. E., 797 Marietta Ave., Milwaukee, Wis. (T)
- Meissner, G., 178 Second St., Mineola, L. I., N. Y. (T)
- Meister, L. G., Marysville, Mich. (T)
- Melton, C. C., 3507 E. 34th St., Kansas City, Mo. (T)
- Menetee, J., 2823 Hanes Ave., Richmond, Va. (T)
- Meng, P. H., 1430 S. Quaker St., Tulsa, Okla. (T)
- Melville, P., Langley Field, Hampton Roads, Va. (T)
- Mendez, B., U. S. Naval Air Station, Hampton Roads, Va. (P)
- Menken, A. von B., 34 W. 52nd St., New York, N. Y. (I)
- Meredith, R. L., 2841 Tilden St., N. W., Washington, D. C. (T)
- Merlan, E. F., Strykersville, N. Y. (P)
- Merriam, A. E., 300 S. Clifton St., Wichita, Kan. (T)
- Merrill, B. M., 960 Wilshire Blvd., Los Angeles, Calif. (P)

- Merrill, H. W., 203 Santa Anita Ct., Sierra Madre, Calif. (P)
- Merrill, H. T., 1662 Valmont St., New Orleans, La. (T)
- Merrill, M. M., Curtiss Flying Service, Inc., Garden City, L. I. (T)
- Merrill, R. H., Anchorage, Alaska (T)
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- Meyer, A. B., 2914 Broadway, Chicago, Ill. (T)
- Meyer, W. W., Little Rock, Fla. or 4945 N. St. Louis, Chicago, Ill. (T)
- Meyers, C. W., Advance Aircraft Co., Troy, Ohio (T)
- Middagh, E. H., Arrowhead Airways, Superior, Wis. (T)
- Miller, B. O., 515 18th St., Moline, Ill. (T)
- Miller, E. F., 424 W. Front St., Berwick, Pa. (P)
- Miller, F. M. S., 4953 Cartwright Ave., Lankershim, Calif. (T)
- Miller, G. C., Airways Division, Dept. of Com., Washington, D. C. (T)
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- Miller, J. H., 3044 N. Clark St., Chicago, Ill. (T)
- Miller, J. M., Route 1, Box 123, New Brunswick, N. J. (T)
- Miller, I. A., % American Eagle Aircraft Corp., 2330 Harrison St., Kansas City, Mo. (T)
- Miller, L. B., 209 Stutzman St., Council Bluffs, Iowa (T)
- Miller, L. C., Box 643, Los Angeles, Calif. (T)
- Miller, L. W., OCAC, Washington, D. C. (T)
- Miller, R. S., Athletic Club, St. Paul, Minn. (T)
- Miller, W. A., P. O. Box 395, Ft. Worth, Tex. (P)
- Miller, W. T., % Airways Extension Supt., Hurley Wright Bldg., Washington, D. C. (T)
- Mills, F., Essington, Pa. (T)
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- Mitchell, R. L., Tallulah, La. (T)
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- Monday, W. A., 3200 Barnett St., Mahoney Airlines, San Diego, Calif. (T)
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- Montague, H. H., 15 Elati St., Denver, Colo. (T)
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- Montee, R., 422 Duquesne St., Culver City, Calif. (T)
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- Morey, H. A., 614 E. Gorham St., Madison, Wis. (T)
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- Morris, J. P., Pittsburgh Airport, Aspinwall Branch, Pittsburgh, Pa. (T)
- Morton, F. A., 36 S. Valley St., Kansas City, Kan. (T)
- Morton, J. J., Curtiss Field, Long Island, N. Y. (T)
- Moseley, C. C., 113 W. 9th, Los Angeles, Calif. (T)
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- Myers, W. F., 25 Ninth St., Hialeah, Fla. (T)
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- Nelson, F. S., 687 Second Ave., Salt Lake City, Utah (T)
- Nelson, F., Middletown Airport, Middletown, Pa. (T)
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- Newhouse, W. A., Miller Corp., New Brunswick, N. J. (LC)
- Newkirk, E. B., Jr., Call Hotel, N. Wilkesboro, N. C. (T)
- Newton, R. D., Picher, Okla. (T)
- Newton, T. W., 1645 S. 12th St., Birmingham, Ala. (I)
- Nicholas, R., Marshall, Mo. (T)
- Nicholls, P., 487 Chamber of Commerce Bldg., Los Angeles, Cal. (T)
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- Norton, L. B., Southampton, Pa. (P)
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- O'Brine, F., Carrollton, Mo. (T)
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- Omlie, V. C., Box 3055, Crosstown, Memphis, Tenn. (T)
- Ort, K., York, Pa. (T)
- Overacker, C. B., Mitchel Field, Hempstead, N. Y. (T)
- Overcashier, F., 8 Arcadia Bldg., Detroit, Mich. (T)
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- Parker, A. N., 844 Rush St., % Erwin, Wasey & Co., Chicago, Ill. (T)
- Parker, B., 531 E. 12th St., Bartlesville, Okla. (T)
- Parker, E. K., Copley Plaza Apts., No. 53, Dearborn, Mich. (T)
- Parker, W., 2400 Euclid Ave., Cleveland, Ohio (T)
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- Parshall, R. P., 229 5th St., Portland, Ore. (T)
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- Paschal, A., Marine Flying Field, Quantico, Va. (T)
- Patterson, A. L., Rogers Airport, Los Angeles, Calif. (T)
- Patterson, L., 700 Cathedral St., Baltimore, Md. (T)
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- Pavey, W., Madison & Edwards Rd., Cincinnati, Ohio (T)
- Payne, J. F., Tallulah, La. (T)
- Payne, P. B., Wilbur Wright Field, Fairfield, Ohio (T)
- Pears, R. W., 12 Juniper Ave., Mineola, N. Y. (T)
- Pearson, R., 1507 W. Alabama St., Houston, Tex. (P)
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- Peoples, C. E., National Air Transport Co., Kansas City, Mo. (T)
- Petfield, T., Route C, Box 34, Modesto, Calif. (T)
- Pernington, W. K., Wrightsville, Sound, Wilmington, N. C. (T)
- Pertland, H. B., 329 I. W. Hellman Bldg., Los Angeles, Calif. (T)
- Perea, M. M., Capt. Hill Station, Oklahoma City, Okla. (P)
- Perin, G. H., Jr., 708 W. Brighton Ave., Syracuse, N. Y. (T)
- Perry, C. O., Fairfield Air Intermediate Depot, Fairfield, Ohio (T)
- Person, A. G., Selfridge Field, Mt. Clemens, Mich. (T)
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- Peters, F. H., 2309 Lincoln Blvd., Venice, Calif. (T)

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- Phillips, A., Box 225, Circleville, Ohio. (P)
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- Phillips, J. S., Electra, Tex. (T)
- Pickenpack, G. R., 158 Jericho Turnpike, Floral Park, L. I., N. Y. (T)
- Pickering, R., Police Patrol Field, North Kansas City, Mo. (LC)
- Pickup, C. V., Box 3, Thayer, Mo. (T)
- Piggott, G. M., P. O. Box 1162, Tulsa, Okla. (P)
- Pilcher, R. J., 512 A. G. Bartlett Bldg., Los Angeles, Calif. (T)
- Pilgrim, O. W., 939 Park St., Alameda, Calif. (LC)
- Pinaire, O. H., 1603 Va. Ave., Tampa, Fla. (T)
- Pitcairn, H. F., 1830 Land Title Bldg., Philadelphia, Pa. (T)
- Planck, C. E., 745 Oak St., Cincinnati, Ohio (P)
- Pohlman, S. C., 3252 Lakeshore Ave., Oakland, Calif. (P)
- Poindexter, H. B., Wilmont Apts., Raleigh, N. C. (T)
- Polsson, T. H., 2941 Geary St., San Francisco, Calif. (T)
- Pomeroy, G. C., Chicago Municipal Airport, Chicago, Ill. (T)
- Pond, G. R., Continental Motor Corp., Detroit, Mich. (T)
- Pond, S. L., Gulf St., Milford, Conn. (T)
- Porter, J. P., 7118 Constance Ave., Chicago, Ill. (P)
- Post, G. B., 475 Fifth Ave., New York, N. Y. (T)
- Potter, N. W., 2090 Grove St., San Francisco, Calif. (T)
- Portt, E., 1606 North Second St., Monroe, La. (T)
- Powell, H. H., 3122 Sheridan Rd., Chicago, Ill. (P)
- Prater, N., 5118 Pennsylvania Ave., E., Pittsburgh, Pa. (P)
- Pratt, J. E., 487 Chamber Commerce Bldg., Los Angeles, Calif. (P)
- Preil, A. O., 2075 Nichols Ave., Washington, D. C. (S. E.) (T)
- Pressler, P. G., 3327 Indiana Ave., Chicago, Ill. (T)
- Preston, E. L., 1004 Cleveland Ave., Lansing, Mich. (T)
- Price, J. H., Bolling Field, District of Columbia (T)
- Prichard, A. L., 422 W. Oak St., Louisville, Ky. (T)
- Prindle, W. D., 2220 Hennepin Ave., Minneapolis, Minn. (P)
- Proctor, W. H., P. O. Box 2214, 3184 S. W. 27th St., Miami, Fla. (T)
- Prohinsie, C., 71 2nd St., Stewart Manor, L. I., N. Y. (T)
- Prosch, W. E., 209 N. 18th St., Kansas City, Kan. (T)
- Quase, W. C., 430 S. Catherine St., La Grange, Ill. (T)
- Quillen, G. M., 3957 W. 8th St., Cincinnati, Ohio (T)
- Quinby, R. T., 2302 13th Ave., Moline, Ill. (T)
- Quinn, C., Monroe Chemical Co., Quincy, Ill. (T)
- Quinn, C., 5001 Olive St., Kansas City, Mo. (T)
- Quinn, L. P., 911 N. Collins St., Okmulgee, Okla. (T)
- Quinn, N., Curriess Field, Garden City, L. I., N. Y. (LC)
- Rach, C. W., 442 Van Duzer St., Staten Island, N. Y. (T)
- Rader, J. J., 433 Reinhard Ave., Columbus, Ohio (T)
- Radoll, R. W., 1240 Selby Ave., St. Paul, Minn. (T)
- Rafus, H. W., 508 West Ave., Jenkintown, Pa. (T)
- Raichart, J. D., 323 Quincy St., Pueblo, Colo. (P)
- Randall, J. F., 3146 19th St. N. W., Washington, D. C. (P)
- Rankin, I. G., P. O. Box 4268, Portland, Ore. (T)
- Rasmussen, C. W., V. T. Sqd. Nine, Naval Air Station, Hampton Roads, Va. (T)
- Ray, J. G., Willow Grove, Pa. (T)
- Read, D. B., 220 Algoma Blvd., Oshkosh, Wis. (T)
- Ream, G. D., 5436 Bryant Ave., Oakland, Calif. (T)
- Reavis, C. L., 2037 Franklin St., Denver, Colo. (T)
- Reed, I. B., Robertson Aircraft Corp., Anglum, Mo. (P)
- Reed, R. A., 1621 East Ave., Kalamazoo, Mich. (T)
- Reiss, S. A., 327 Carroll St., Takoma, D. C. (T)
- Remelin, E. L., 113 W. 9th St., Los Angeles, Calif. (T)
- Rentz, R. J., 5340 Nicollet Ave., Minneapolis, Minn. (T)
- Reynolds, C. F., 2412 N. Talbott St., Indianapolis, Ind. (T)
- Reynolds, F. C., 601 Arlington Rd., Roanoke, Va. (T)
- Rhea, R., 1401 N. Nevada Ave., Colorado Springs, Colo. (P)
- Rhenstrom, E. G., 911 74th St., Kenosha, Wis. (T)
- Thiner, L. H., 2643 N. Mill St., Kansas City, Kan. (T)
- Rhoads, E. S., U. S. Naval Air Station, Hampton Roads, Va. (T)
- Richardson, D. G., 1107 N. 6th St., Monroe La. (T)
- Richter, P. E., Jr., Aero Corp. of Calif., Western Ave., Los Angeles, Calif. (T)
- Rickard, V. A., R. D. No. 8, Schenectady, N. Y. (T)
- Riddle, J. P., Lunken Airport, Cincinnati, Ohio (T)
- Rifley, C. W., 208 4th Ave. S., St. Petersburg, Fla. (P)
- Riggs, R., 3415 Paser, Kansas City, Mo. (T)
- Rigney, A. E., 3601 E. 2nd St., Dayton, Ohio (T)
- Rinchart, H. M., 15 West Bowman Ave., Dayton, Ohio (T)

- Rinehart, J., 658 Williams Ave., Portland, Ore. (T)
- Ringel, P. J., 2100 McCallie Ave., Chattanooga, Tenn. (LC)
- Risser, A. A., Wisner, Neb. (T)
- Robbins, H. C., Akron Airport, Inc., Akron, Ohio (T)
- Roberson, G. O., Chanute Field, Rantoul, Ill. (T)
- Roberts, F. P., 519½ New York St., Long Beach, Calif. (T)
- Roberts, L., North Judson, Ind. (T)
- Roberts, V. L., Box 400, Fargo, N. D. (T)
- Robertson, A., 823 Louisiana St., Little Rock, Ark. (T)
- Robertson, D. R., 5549 Pershing Ave., St. Louis, Mo. (T)
- Robertson, E. W., R. F. D. No. 5, Arlington, Va. (T)
- Robertson, F. H., 7525 Standford Ave., St. Louis, Mo. (T)
- Robertson, W. A., 613 Garrison Ave., Fort Smith, Ark. (P)
- Robertson, W. B., 40 Kingsbury Pl., St. Louis, Mo. (T)
- Robertson, W. M., 7417 Lyndover Pl., St. Louis, Mo. (T)
- Robey, W. E., R. F. D. No. 5, Holden, Mo. (T)
- Robinson, E. M., Jr., 1527 Age-Herald Bldg., Birmingham, Ala. (P)
- Robinson, H. C., 508 Franklin St., Johnstown, Pa. (I)
- Robinson, M. G., 1361 Humboldt St., Denver, Colo. (T)
- Rockwood, E. C., Box 1423, Ft. Worth, Tex. (T)
- Rodenbaugh, E. S., 1415 Shawmut Pl., St. Louis, Mo. (I)
- Roderick, C. W., 4031 Eastern Ave., Cincinnati, Ohio (LC)
- Rodgers, G. P., Apt. 36, 241 S. Munroe Blvd., Dearborn, Mich. (T)
- Roepke, L. W., Waterville, Kan. (T)
- Rogers, G. W., Logan Field, Dundalk, Md. (T)
- Rogers, H., P. O. Box 3608, Miami, Fla. (T)
- Rogerson, J. B., 779 46th Ave., San Francisco, Calif. (P)
- Rolps, S., Vermejo Park, New Mexico (T)
- Roll, P. A., Box 2454, Ft. Meyers, Fla. (T)
- Romkey, G. J., 1230 Washington St., Burlington, Iowa (T)
- Ronne, E. M., Buffalo Airport, Station E, Buffalo, N. Y. (T)
- Rorick, R. L., 3560 Pane Ave., Cincinnati, Ohio (LC)
- Rose, E. P., 48th Squadron, Kelly Field, San Antonio, Tex. (T)
- Rose, F., 836 Kingston Ave., Piedmont, Calif. (T)
- Rosenberger, W. S., 110 Tremlett Ave., San Antonio, Tex. (T)
- Rosto, O. A., 1210 N. Charles St., Baltimore, Md. (T)
- Rounds, E. W., 5130 5th St. N. W., Washington, D. C. (T)
- Rouse, H., 5923 Haas Ave., Los Angeles, Calif. (T)
- Rowe, B. L., West Indian Aerial Express, Barahana, Rep. Dominicana, S. A. (T)
- Rowland, D. E., 29 Perry St., New York, N. Y. (T)
- Rowland, E., P. O. 638, Wichita, Kan. (T)
- Rowlandson, S., 136 Parkview Ave., Lowell, Mass. (P)
- Royle, W. H., 538 Scenic Ave., Piedmont, Calif. (T)
- Rubner, M. M., 160 N. La Salle St., Chicago, Ill. (T)
- Ruch, L. D., 1122 S. Maple St., McPherson, Kan. (T)
- Rumill, G., Indian Point, Maine (T)
- Russ, J., 2210 W. Market St., Louisville, Ky. (LC)
- Russell, P. J., Lincoln Standard Aircraft Co., Lincoln, Neb. (T)
- Russell, R. F., R. F. D. 8, Box 131, Battle Creek, Mich. (LC)
- Rutledge, J. L., 83 Santa Ynez Ave., San Francisco, Calif. (T)
- Salomon, L. G., 1088 Park Ave., New York, N. Y. (I)
- Salzman, J. R., 553 25th Ave., San Francisco, Calif. (I)
- Sampson, A. M., Bellview, Minn. (T)
- Samson, S. J., Chanute Field, Rantoul, Ill. (T)
- Sanblom, J. V., Rogers Airport, Mesa Drive & St. Barbara, Los Angeles, Calif. (T)
- Sanders, W. A., 1804 62nd St., S. Berkeley, Calif. (T)
- Sanders, W. C., 328 Robinson Pl., Shreveport, La. (T)
- Sargent, W. O., 19 Florence Ave., Holyoke, Mass. (T)
- Sater, M. L., 4538 Page St., St. Louis, Mo. (P)
- Saunders, C., 565 Goodwyn Ave., Memphis, Tenn. (P)
- Savage, C. H., Aircraft Squadrons, E.C.E.F., M. B., Quantico, Va. (T)
- Savage, F., Deerfield, Ill. (T)
- Scarritt, D. DeR. M., Aeronautics Br., Dept. of Com., Washington, D. C. (T)
- Schang, L. C. P., 1864 Winfield, Los Angeles, Calif. (LC)
- Schick, H. M., 601 Elcamino Real, San Mateo, Calif. (T)
- Schlesinger, J. W. L., B. F. Schlesinger & Son, Inc., Oakland, Calif. (P)
- Schmich, C. H., 140 Mt. Vernon Ave., Portsmouth, Va. (P)
- Schoenlein, R. L., Selfridge Field, Mt. Clemens, Mich. (T)
- Schueler, R. F., 63 Bates Ave., Winthrop, Mass. (T)
- Scott, O. E., Anglum, Mo. (T)
- Scott, W. L. Jr., Bolling Field, Washington, D. C. (T)
- Shultz, R. G., Long Island R.R. Co., 8th Ave. & 33rd St., New York City (LC)
- Schwaemmle, F. J., 301 Seventh Ave., Haddon Heights, N. J. (T)
- Scott, A., 121 E. Hardin, Pine Bluff, Ark. (T)
- Searle, C. E., 1728 Atkinson Ave., Detroit, Mich. (LC)
- Seitz, D., 209 N. 18th St., Kansas City, Kan. (T)
- Self, W. I., 211 W. Cumberland Ave., Knoxville, Tenn. (LC)
- Sellers, I. J. Jr., 1114 S. 17th St., Birmingham, Ala. (P)
- Setvate, C. T., Milwaukee County Airport, Rt. 1, Box 516, Station "D" Milwaukee, Wis. (T)
- Sewell, H. E., Q. 16B, U. S. Naval Air Station, Hampton Roads, Va. (T)
- Shaefer, A. B., 703 Edison Ave., Dayton, Ohio (P)
- Shaffer, W. J., Dauphin, Penn. (T)

- Shaffer, W. L., 14435½ Sylvan St., Van Nuys, Calif. (T)
- Shank, Bob, 749 6th Ave., Huntington, W. Va. (T)
- Shank, E. S., 1312 Harmon Pl., Minneapolis, Minn. (T)
- Shankle, C. E., Boston Airport, E. Boston, Mass. (T)
- Shannon, S. L., Hazel Hill, Fredericksburg, Va. (P)
- Shannon, W. S., Box 2302, DeSoto Station, Memphis, Tenn. (T)
- Sharp, S. H., Kingston, Ohio (T)
- Sharpnack, J. W., Newhouse Hotel, Salt Lake City, Utah (T)
- Shaw, G. W., Caribou, Me. (T)
- Shealy, G. A., 502 W. Ontario St., Atlanta, Ga. (P)
- Shebat, H. V., 709 Schuyler St., Syracuse, N. Y. (T)
- Shelton, B. M., Box 694, Arcadia Calif. (T)
- Shelton, F. E., Box 295, Denton, Tex. (T)
- Shepard, M. T., Aircraft Squadrons, M. B., Quantico, Va. (T)
- Sherrick, L. D., 918 Lakeview Ave., Orlando, Fla. (T)
- Sherwood, G. O., 343 N. Isabel St., Glendale, Calif. (T)
- Shleppay, G. T., Box 105, Delano, Calif. (T)
- Shoblaske, F. H., 109 N. 10th St., Manitowoc, Wis. (T)
- Shoemaker, C. E. Jr., 1522 Gaines St., Little Rock, Ark. (T)
- Shoenhair, L. F., 1214 S. Norton Ave., Los Angeles, Calif. (T)
- Shore, S. R., 104 E. 35th St., Kansas City, Mo. (T)
- Short, S. J., 853 Pleasant St., Oak Park, Ill. (T)
- Shostak, L. K., 766 N. Van Ness Ave., Los Angeles, Calif. (P)
- Shrader, R. C., Continental Hotel, 41st & Broadway, New York City (T)
- Shreve, A. L., 1330 17th St., Denver, Colo. (P)
- Shugart, D. F., 3057 Calle Noguera, Santa Barbara, Calif. (T)
- Shumaker, F. N., A.C., C.N.G., Denver, Colo. (T)
- Siever, W. A., As E.C.E.F., M.B., Quantico, Va. (T)
- Sievert, W. C., 5934 S. Cicero Ave., Chicago, Ill. (T)
- Sikorsky, I. I., Sikorsky Mfg. Co., College Point, Long Island, N. Y. (P)
- Simon, R., Box 549, Farmingdale, Long Island, N. Y. (I)
- Simpson, R. W., Westbury, N. Y. (T)
- Simrell, W. F. Jr., V.T. Squadron 1-S, Naval Air Station, Hampton, Va. (T)
- Sims, M. B., 1111 Tribune Bldg., Tampa, Fla. (P)
- Sims, O. B., Gen. Del., Bloomington, Ill. (T)
- Sinclair, C., 4515 Minnehaha Ave., Minneapolis, Minn. (T)
- Skanse, F. E., Bolling Field, Washington, D. C. (T)
- Skocdopole, E. F., 341 Forest Ave., River Forest, Ill. (T)
- Skoning, J. H. S., 555 E. 60th St., Chicago, Ill. (T)
- Slatery, W. J., Bureau of Navigation, Navy Dept., Washington, D. C. (T)
- Sloan, K., Bolling Field, Washington, D. C. (T)
- Sloninger, E. L., 912 D St., Lincoln, Neb. (T)
- Slye, A. L., 1423 Hanger St., Little Rock, Ark. (T)
- Smith, A. W., Department of Commerce, Airways Div., Washington, D. C. (T)
- Smith, A. Y., Chanute Field, Rantoul, Ill. (T)
- Smith, C. B., 2309 Chicago Ave., Minneapolis, Minn. (T)
- Smith, C. W., 2220 N. Nevada St., Colorado Springs, Colo. (P)
- Smith, G. R., Clenside, Montgomery County, Pa. (P)
- Smith, H. G., Air Mail Field, Maywood, Ill. (T)
- Smith, H. T., 427 S. W. 11th Ave., Miami, Fla. (T)
- Smith, J. W., 5930 Chew St., Germantown, Philadelphia, Pa. (T)
- Smith, N. S., 5273 Ridge Ave., Philadelphia, Pa. (T)
- Smith, R. K., % Brock & Weymouth, Inc., 1607 Walnut St., Philadelphia, Pa. (T)
- Smith, S. R., Bryn Athyn, Pa. (I)
- Smith, W. B., Blundale, Ga. (T)
- Smith, W. B., Central Point, Ore. (T)
- Smith, W. L., Air Mail Service, New Brunswick, N. J. (T)
- Snow, C., 117 Bay State Road, Boston, Mass. (T)
- Snyder, W. O. Jr., Harwood, Md. (T)
- Sodowski, J. B., P. O. Box 5, Coffeyville, Kan. (T)
- Sohler, L. J., 1145 N. 7th St., Mankato, Minn. (T)
- Snyder, D. L., 12 S. 9th St., Minneapolis, Minn. (T)
- Solenberger, D. MacK., Simplex Ring Co., 408 Spring St., Atlanta, Ga. (T)
- Somerville, H., 5600 16th St., N. W., Washington, D. C. (P)
- Somerville, T. Jr., 5600 16th St., N. W., Washington, D. C. (P)
- Sommers, J. E., 400 S. Main St., Canandaigua, N. Y. (T)
- Soper, J. C., 686 Selden Ave., Detroit, Mich. (T)
- Spannagel, G. E., 716 N. 23rd St., Richmond, Va. (T)
- Spatz, C., War Department, Washington, D. C. (T)
- Speer, D. M., 6614 Kenwood Ave., Chicago, Ill. (T)
- Speear, H. A., International Aircraft Corp., Longbeach, Calif. (T)
- Spencer, B. M., 943 N. Louise St., Glendale, Calif. (T)
- Spencer, E., Box 826, Seminole, Okla. (T)
- Spencer, P. H., 805 Main St., Hartford, Conn. (T)
- Spencer, W. F., Sweeney Airport, Kansas City, Kan. (T)
- Sporrer, A. C., Aero Club of Illinois, 430 S. Michigan Ave., Chicago, Ill. (T)
- Spracher, C. W., 4426 Rusk Ave., Houston, Tex. (T)
- Springer, T. E., 877 Bundy Drive, Los Angeles, Calif. (T)
- Squier, C. E., 796 Bedford Road, Grosse Points, Mich. (T)
- Stafford, E. H., Box 3608, Miami, Fla. (I)
- Stanely, A. J., 801 W. Church, Elmira, N. Y. (T)
- Stanton, O., 79 Marigold Ave., Buffalo, N. Y. (P)
- Starbuck, A. D., 2440 Van Ness Ave., San Francisco, Calif. (T)

- Stark, H., 1441 Avon St., Youngstown, Ohio (T)
- Stark, H., 112 S. Cherry St., Poughkeepsie, N. Y. (T)
- Starka, E. O., 1141 E. 81st Place, Chicago, Ill. (LC)
- Starkey, B., 1014 Cumberland Road, Glendale, Calif. (T)
- Stearman, L. C., 353 Third Ave., Venice, Calif. (T)
- Steele, C. E., Dodge City, Kan. (T)
- Steele, C. H., 703 W. 43rd St., Los Angeles, Calif. (T)
- Steele, D. M., 4602 Los Feliz Blvd., Los Angeles, Calif. (T)
- Steele, S. L., Southland Hotel, Macon, Ga. (T)
- Steeley, H. H., Colonial Hotel, Milwaukee, Wis. (P)
- Steinke, G. I., Plainview, Minn. (LC)
- Steinle, F., Western Air Express, Inc., 113 W. 9th St., Los Angeles, Calif. (T)
- Steinmetz, C. W., Apt. 809 Corcoran Courts, Washington, D. C. (T)
- Stephens, M. W. Jr., 920 King's Road, Hollywood, Calif. (T)
- Stephens, O. L., Mitchel Field, Long Island, N. Y. (T)
- Stephenson, A. W., Dillon, Mont. (T)
- Sterling, C. M., Marshall, Mo. (T)
- Sterling, M., 241 Brady St., Detroit, Mich. (T)
- Stetson, S. C., Elkins Park, Penn. (P)
- Stevenson, J. J., 620 N. 53 St., Philadelphia, Pa. (LC)
- Stevenson, R. M., 21 W. 54th St., Kansas City, Mo. (T)
- Steward, L. H., Plano, Ill. (T)
- Stewart, C. K., 348 E. Sharpwack St., Mt. Airy, Philadelphia, Pa. (P)
- Stewart, E. L., % G. F. Stewart, R. R. No. 4, Stillwater, Okla. (T)
- Stewart, G. A., Coates, N. C. (T)
- Stewart, W. F., Rm. 614, 405 Montgomery St., San Francisco, Calif. (T)
- Still, C. L., Electra, Tex. (P)
- Stimson, T. D., 912 White Bldg., Seattle, Wash. (P)
- Stinson, E. A., Northville, Mich. (T)
- Stinson, M. C. (Miss), Wardman Park Hotel, Washington, D. C. (P)
- Stirewalt, H. A., 1616 Fairview St., Berkeley, Calif. (P)
- Stone, F. A., 1530 S. 18th St., Birmingham, Ala. (T)
- Stone, R. V., 725 Jackson St., San Antonio, Tex. (T)
- Stone, R. L., 4907 W. Pine Blvd., St. Louis, Mo. (P)
- Stone, V. D., 1125 S. University Blvd., Denver, Colo. (T)
- Stoneburner, H. J., 1862 Bersford Road, Cleveland, Ohio (T)
- Storrie, W., 132 N. Wolcott St., Casper, Wyo. (T)
- Syrasburg, P., 1728 Seminole St., Detroit, Mich. (T)
- Strode, G. N., Naval Air Station, Hampton Roads, Va. (T)
- Sroop, E. C., Gen. Del., Cristobal, C. X., Panama (P)
- Stuart, A. E., National Air Transport, Kansas City, Mo. (T)
- Stultz, W. L., Reynolds Airways, Inc., Vanderbilt Ave., New York City, (T)
- Suber, C. A., V. O. Squadron, 111 U. S. Naval Air Station, Hampton Roads, Va. (T)
- Summers, J. D., Aeronautics Br., Dépt. Com., Washington, D. C. (T)
- Sussin, M., 2507 N. Sacramento Ave., Chicago, Ill. (T)
- Sutherland, C., 1411 Beaver, Des Moines, Iowa (T)
- Sutton, H. A., McCook Field, Dayton, D. C. (T)
- Sweet, H. A., Airport, Salt Lake City, Utah (T)
- Sweeney, E. W., 3821 Central Ave., Indianapolis, Ind. (T)
- Sweet, H. G., 411 Interstate Trust Bldg., Denver, Colo. (LC)
- Swinson, C. D., Copley Plaza, Apt. 57, Dearborn, Mich. (T)
- Tabraham, G. E., 1117 White St., Ann Arbor, Mich. (T)
- Taft, P. E., Box 382, Hilton Village, Va. (T)
- Taliaferro, A. P. Jr., Racquet Club, Washington, D. C. (T)
- Taliaferro, C. C., 3rd, 518 Grove St., Sewickley, Pa. (P)
- Tarbutton, R. H., Route 1, Britton, Okla. (T)
- Taylor, B. C., 357 1st Ave., Salt Lake City, Utah (LC)
- Taylor, D., 3511 Mt. Elliott St., Detroit, Mich. (T)
- Taylor, H. B., 6150 Richmond Ave., Dallas, Tex. (T)
- Taylor, J. B., 720 S. Madison Ave., Pasadena, Calif. (T)
- Taylor, S. J. Jr., Thompson Aeronautical Corp., Cleveland Airport, Cleveland, Ohio (T)
- Tennant, H. W., 715 S. Dakota Ave., Sioux Falls, S. D. (T)
- Terletzky, L., Edgehill Inn, Spuytin Duyil, N. Y. (T)
- Theis, R. A., 1119 Commerce Bldg., Kansas City, Mo. (P)
- Thomas, G., 3515 W. 83rd Place, Chicago, Ill. (T)
- Thomas, G. E., Box 816, Tallulah, La. (T)
- Thomas, J. V., 908 Princeton Ave., Birmingham, Ala. (T)
- Thomas, L. E., 222 N. Berendo St., Los Angeles, Calif. (T)
- Thomas, R. F., 345 Engineers Bldg., Cleveland, Ohio (T)
- Thomas, R. D., 22 Weston St., Waltham, Mass. (T)
- Thomas, W. D., Navy Department, Washington, D. C. (T)
- Thomas, W. E., 135 Riverside Ave., Little Rock, Ark. (P)
- Thomas, W. E., 1240 S. Figueroa St., Los Angeles, Calif. (T)
- Thompson, A. R., Woodward Field, Salt Lake City, Utah (T)
- Thompson, W. E., 1209 Harvey Bldg., West Palm Beach, Fla. (P)
- Thompson, E. W., 7 Wood St., Pittsburgh, Pa. (T)
- Thro, L. A., 1715 E. 41st or Minnesota Aircraft Co., 406 6th Ave., S., Minneapolis, Minn. (T)
- Thropp, J. E., 3rd, R. D. No. 1, Morrisville, Pa. (T)
- Tiffany, C., 56 5th Ave., Mineola, Long Island, N. Y. (T)
- Tift, R. H., 546 Delaware Ave., Buffalo, N. Y. (P)
- Tipton, W. D., Headquarters Armory, Baltimore, Md. (T)

- Tobin, E. G., 1515 Main Ave., San Antonio, Tex. (T)
- Todd, E. B., Alexander Aircraft Co., Denver, Colo. (T)
- Tomick, F. B., Clover Field, Santa Monica, Calif. (T)
- Tomlinson, D. E., V. F. Squadron 6, San Diego, Calif. (T)
- Tompkins, F. V., Ford Airport, Dearborn, Mich. (T)
- Toncray, H. E., Lone Oak, Tex. (T)
- Toomey, H. A., Marion Apts., Church St., Knoxville, Tenn. (P)
- Tourtellot, G. P., McCook Field, Dayton, Ohio (T)
- Tower, L. R., Boeing Airplane Co., Seattle, Wash. (T)
- Towle, S. W. Jr., Chanute Field, Rantoul, Ill. (T)
- Townsend, G. D., Naval Aircraft Factory, Navy Yard, Philadelphia, Pa. (T)
- Travis, A. A., 1210 S. Westnedge Ave., Kalamazoo, Mich. (LC)
- Treat, V. E., R. D. 2, Ashbury Park, N. J. (T)
- Trotter, H. E., Santa Susana, Calif. (T)
- Trumbull, Hon. J. H., Plainville, Conn. (P)
- Truskett, A. L., Caney, Kan. (LC)
- Truskett, H. E., Caney, Kan. (LC)
- Tuohy, P. R., 2997 Buena Vista Ave., Detroit, Mich. (T)
- Turgeon, W. R., 4861 N. Washtenaw Ave., Chicago, Ill. (LC)
- Turner, I. S., 415 S. Peoria St., Tulsa, Okla. (T)
- Turner, R., Box 1969, Richmond, Va. (T)
- Turner, S. H., Mitchel Field, L. I., N. Y. (T)
- Tuxhorn, B. M., 810 Cleveland Ave., Kansas City, Mo. (T)
- Tweed, J. H., Box 919, New Haven, Conn. (T)
- Twibell, J. L., 514 N. Plum St., Eureka, Kan. (LC)
- Tyler, G., 200 Alhambra St., San Francisco, Calif. (T)
- Ulbrich, W., 109 Front St., Mineola, Long Island, N. Y. (T)
- Underwood, S. L., Interstate Airways, Inc., Love Field, Dallas, Tex. (T)
- Unger, K. R., 61 Madison Ave., Madison, N. J. (T)
- Upston, J. E., 2121 New York Ave., Washington, D. C. (T)
- Vance, C. K., Concord, Calif. (T)
- Vance, E. T., Great Falls, Mont. (T)
- Vance, L. S., 1334 Eastern Parkway, Louisville, Ky. (T)
- Vance, P. A., Box 290, San Antonio, Tex. (T)
- Van De Water, D. G., 7 Locust Ave., Port Washington, Long Island, N. Y. (T)
- Van Vechten, K. S., 510 Cheyenne Rd., Colorado Springs, Colo. (P)
- Van Wagner, V. J., Curtiss Field, Garden City, Long Island, N. Y. (P)
- Van Zandt, J. P., General Motors Bldg., Detroit, Mich. (T)
- Vaughan, W. O., 300 E. Garfield Bldg., Chicago, Ill. (T)
- Veale, W. H., 395 E. Chapel St., Hazleton, Luzerne, Pa. (P)
- Veigel, C. A., Lunken Airport, Cincinnati, Ohio (LC)
- Vermilya, W. Jr., Airport, Little Rock, Ark. (T)
- Vincent, J. A., 4033 S. Benton, Kansas City, Mo. (LC)
- Vine, W. R., 336 Oliver Road, Wyoming, Ohio (T)
- Vinet, C. D., Byberry Road, Woodmont, Pa. (P)
- Viriden, R. B., 212 Edna St., San Francisco, Calif. (T)
- Voellmecke, A., Luxor Apts., Main & 20th Sts., Little Rock, Ark. (P)
- Vogt, C. D., Hartfield, N. Y. (T)
- Voight, M. L., Jr., 947 E. 29th St., Brooklyn, Calif. (T)
- Von Hake, R. A., 2938 Santa Monica Blvd., Santa Monica, Calif. (T)
- Voss, T. S., Rodgers Field, Pittsburgh Airport, Pittsburgh, Pa. (T)
- Vowles, R. L., 2424 Central Ave., Alameda, Calif. (P)
- Wade, F. D., Sweeney Airport, Kansas City, Kan. (T)
- Wade, L., 30 W. 44th, New York City, N. Y. (T)
- Wadlow, T. T., 1217 Forest Ave., Wichita, Kan. (T)
- Wagner, R. L., 3705 N. 27th St., Omaha, Neb. (T)
- Walker, J. H., 1702 Orange St., N. Little Rock, Ark. (T)
- Walker, H., 2730 30th Ave., S. Seattle, Wash. (T)
- Walker, J. G., 2222 Que St., N. W., Washington, D. C. (LC)
- Walker, K. M., Langley Field, Va. (T)
- Wall, E. S., 7 Cross Roads Court, Snelling at Larpentuer, Rt. 5, St. Paul Minn. (LC)
- Wallace, F. C., Betterndorf, Iowa, % Jenkins Radio Co. (P)
- Wallace, L. R., 3101 Main St., Joplin, Mo. (T)
- Walker, G., Duncan Field, San Antonio, Tex. (T)
- Walsh, R. L., Army & Navy Club, Washington, D. C. (T)
- Ward, C. C., 1201 Girard St., N. W., Washington, D. C. (T)
- Ward, E. F., 2140 Woodward Ave., Lakewood, Ohio (T)
- Ward, T. B., Box 241, Hialeah, Fla. (T)
- Wardwell, D. P., 599 Consolidated Royal Bldg., Casper, Wyo. (T)
- Warren, C. J., 1838 W. 65th St., Los Angeles, Calif. (T)
- Warren, J. W., Chanute Field, Rantoul, Ill. (T)
- Warshauer, M., 187 E. Wisconsin Ave., Milwaukee, Wis. (P)
- Wassenberg, L., Marysville, Kan. (T)
- Waterman, W. D., 203 Granada St., Ontario, Calif. (T)
- Watson, H., Grissard Field, Blue Ash, Ohio (T)
- Weaver, E. C., 511 Forest St., Kalamazoo, Mich. (P)
- Weaver, V. J., 2220 McCullough Ave., San Antonio, Tex. (T)
- Weber, A. A., 402 Bank of Commerce, Memphis, Tenn. (P)
- Webster, C. L., Curtiss Flying Service, Garden City, N. Y. (T)
- Webster, L. V., 1320 4th Ave., Moline, Ill. (LC)
- Wedell, J. R., 4715 Baudin Ct., New Orleans, La. (T)
- Weeks, E. O., 999 Third St., Milwaukee, Wis. (P)

- Wehrung, C. C., Lunken Airport, Station C, Cincinnati, Ohio (LC)
- Wehnmiller, H. E., Travel Air Mfg. Co., Wichita, Kan. (LC)
- Welch, W. J., Pitcairn Field, Hallowell, Pa. (LC)
- Weld, F. E., 3533 Fremont Ave., S. Minneapolis, Minn. (T)
- Welles, C. B., 1345 Franklin St., Denver, Colo. (LC)
- Wells, G. O., Box 85, Station A, Toledo, Ohio (T)
- Wells, H. I., Air Mail, 50 E. 42nd St., New York City (T)
- Wells, L. J., 1026 W. 24th St., Los Angeles, Calif. (P)
- Wells, N. E., 1208 Chartres St., Houston, Tex. (P)
- Welsh, St. C. D., 227 Minnesota Ave., Buffalo, N. Y. (LC)
- Wemple, R. G., Jr., 26 Clivedon Ave., Clenside Ave., Pennsylvania (P)
- West, H., 422 Mid-Continent Bldg., Tulsa, Okla. (P)
- Westcott, R. R., 6715 Hancock Ave., St. Louis, Mo. (T)
- Westlake, E. W. Jr., 5303 Hyde Park Blvd., Chicago, Ill. (T)
- Westover, J. F., 1022 8th St. S., Minneapolis, Minn. (T)
- Wethern, C. L., 362 S. Main St., Geneva, N. Y. (T)
- Weyant, R. C., 1419 Hays St., Homestead, Pa. (T)
- Whalley, W. D., 1522 Heliman St., Long Beach, Calif. (T)
- Whately, G. A., Maxwell Field, Montgomery, Ala. (T)
- Wheatly, P. V., Coyote St., Nevada City, Calif. (T)
- Wheatley, W. B., 586 Wetherfield Ave., Hartford, Conn. (T)
- Whelan, B. L., Rinehart-Whelan Co., Dayton, Ohio (T)
- Whitecomb, C. E., Rt. 1, Box 25A, Artesia, Calif. (T)
- White, H. J., 35 E. 84th St., New York, N. Y. (T)
- Whitescarver, J. F., 119 Cheapside, Baltimore, Md. (T)
- Whitney, O. J., 6441 Georgia Ave., Washington, D. C. (P)
- White, E. F., 12 Geranium Ave., Mincola, N. Y. (T)
- White, G. S., 1306 Kanawha St., Charleston, W. Va. (P)
- White, W. J., 90 4th Rd., Queens Village, Long Island, N. Y. (LC)
- Whitney, F., 1143 Browning Blvd., Los Angeles, Calif. (T)
- Wickes, H. W., Jr., 74 Cottage Park Road, Winthrop, Mass. (T)
- Wickford, R. T., Lowell Rd., Concord, Mass. (T)
- Wiens, G. B., 774 11th St., Milwaukee, Wis. (T)
- Wies, G. A. Jr., 192 Linden Road, Mineola, N. Y. (T)
- Wiest, R. O., 484 Lake St., Battle Creek, Mich. (LC)
- Wildman, C. K., 108 W. 94th St., New York, N. Y. (T)
- Willard, S. L., 124 S. Pine St., Little Rock, Ark. (T)
- Willey, L. L., 1447 W. 103rd St., Los Angeles, Calif. (T)
- William, E., Williams Flying Service, Spartansburg, S. C. (T)
- Williams, F. E., 3744 Glenn Feliz Place, Los Angeles, Calif. (T)
- William, R. R., 87 Naples St., San Francisco, Calif. (T)
- Williams, W. M., 416 Deaderick St., Nashville, Tenn. (T)
- Williams, J. R., Niles Airways, Niles, Mich. (T)
- Williams, R. O., 8533 102nd St., Richmond Hill, N. Y. (T)
- Williams, W. D., Cleveland Airport, Cleveland, Ohio (T)
- Williams, W. C., 891½ Third St., Milwaukee, Wis. (T)
- Williams, W. H., 2003 W. York Ave., Spokane, Wash. (T)
- Williamson, S. J., 732 E. 25th St., Norfolk, Va. (T)
- Willingham, G. H., Box 32, San Leandro, Calif. (T)
- Willis, E. N., 921 Pennsylvania Ave., Santa Monica, Calif. (P)
- Willits, S. L., 1161 S. Main St., Los Angeles, Calif. (T)
- Wilson, R., 6419 Irving Park, Chicago, Ill. (LC)
- Wilson, G. G., Port Sunlight Road, N. Billerica, Mass. (LC)
- Wilson, L. C., Clayton, Ind. (T)
- Wilson, P. D., 402 S. Aurora St., Ithaca, N. Y. (T)
- Wilson, J. A., Mitchel Field, Long Island, N. Y. (T)
- Wilson, R. M., 2019 S. Franklin St., Denver, Colo. (T)
- Wiltzie, I. D., Naval Air Station, Hampton Roads, Va. (T)
- Wimberly, F. S., 5507 Linden St., Dallas, Tex. (T)
- Wimer, H., 3143 S. Bannock St., Denver, Colo. (T)
- Windham, J. M., 2143 Madison St., Memphis, Tenn. (T)
- Winings, E. C., R. R. C. Box 182, Indianapolis, Ind. (T)
- Winslow, B. H., Concord, Calif. (T)
- Winstead, C. D., 2432 Rosenthal St., Wichita, Kan. (T)
- Winstott, W. A., Curtiss Flying Service, Garden City, Long Island, N. Y. (T)
- Wise, W. Jr., 2903 Ridgeway Ave., Ensley, Ala. (P)
- Wolf, W. W., 7625 Cottage Grove Ave., Chicago, Ill. (T)
- Wolfe, F. C., Mitchel Field, Long Island, N. Y. (T)
- Wolfenbarger, W. R., Sweeney Airport, Kansas City, Kan. (T)
- Wonsey, H. B., St. Regis Apt. No. 6, Dearborn, Mich. (T)
- Wood, K. C., % Bassey & Wood, Box 142-W, Richmond, Va. (T)
- Wood, J. P., Big Stone Gap, Va. (T)
- Woodall, H., Hanger 6, Love Field, Dallas, Tex. (T)
- Woodgerd, E. D., Bettis Field, McKeesport, Pa. (T)
- Woodhams, I. T., R. F. D. 5, Kalamazoo, Mich. (T)
- Woods, H. L., 1007 N. W. 15th St., Ft. Worth, Tex. (T)
- Woody, A. McI., 144 E. Broadway, Louisville, Ky. (T)
- Woolard, H. F., Trimble, Tenn. (T)
- Woolson, L. M., 2695 Carter Ave., Los Angeles, Calif. (P)
- Wooton, G. A., Route 5, Box 643, Dallas, Tex. (T)

Worthington, J. P., Airways Division,
Dept. of Com., Washington, D. C. (T)
Wright, B. S., 3103 P St., Washington,
D. C. (T)
Wright, C. L., 178 Winthrop St., New
Britain, Conn. (T)
Wright, W. D., 902 Santa Fe Ave., Al-
bany, Calif. (LC)
Yager, F. R., 110 E. 25th St., Cheyenne,
Wyo. (T)
Yoder, K. E., Stuttgart, Ark. (T)
Yonge, L., 220 W. Adams St., Jackson-
ville, Fla. (T)
Yost, L. O., Pinehurst, N. C. or Conyn-
ghan, Pa. (T)

Young, C. D., Lincoln Aircraft Co., Lin-
coln, Neb. (T)
Young, C. M., Aeronautics Br., Dept. of
Com., Washington, D. C. (P)
Youngblood, J. C., 208 Arch St., Little
Rock, Ark. (T)
Zarth, C. Jr., Jordan, Minn. (LC)
Zeh, E., Jr., Appleton, Wis. R. R. 2 (P)
Zeier, C. F., 1009 E. 26th St., Kansas
City, Mo. (T)
Ziegler, J. W. (Capt.), Air Corps, Indiana
National Guard, Anderson Ind. (T)
Zimmerman, E. H., 1509 N. Nevada, Colo-
rado Springs, Colo. (T)
Zinn, G. Jr., Rydal, Pa. (P)



MEDICAL EXAMINERS FOR PILOTS

The following is a complete list of the medical examiners authorized by the Department of Commerce to make the physical examinations of airplane pilots. Those names listed in brackets are giving the examinations in conjunction. Applicants are cautioned that when the examination is made by a group of two or more men that it is necessary to see all those in the group for the completion of the examination. For example, one man may give the eye examination, one man the ear, nose and throat, and the other the general physical examination. In some instances one man gives the complete examination.

The fees for these examinations are as follows: Original examination of Transport, Limited Commercial, and Industrial Pilots, \$15.00; original examination of Private and Student Pilots, \$10.00; all annual re-examinations of whatever class, \$10.00; mid-year check of Transport and Limited Commercial Pilots, \$5.00.

ALABAMA

Birmingham—Dr. Elbert P. Green, 423 First National Bank Bldg.; Dr. E. M. Robinson, Jr., Age-Herald Bldg.

Mobile—Dr. Texey D. Haas, Van Antwerp Bldg.; Dr. J. C. O'Gwynn, O'Gwynn Bldg.

Montgomery—Dr. Bruce F. Holding, 1112 Bell Bldg.

ARIZONA

Phoenix—Dr. William A. Schwartz, 605 Goodrich Bldg.; Dr. Thomas W. Woodman, 404 Heard Bldg.

Tucson—Dr. Edward J. Gotthelf, 9 E. Pennington St.; Dr. Bascom F. Morris, 59 S. Scott St.

ARKANSAS

Ft. Smith—Dr. Andre B. Carney, 216 Merchants' National Bank Bldg.; Dr. J. R. McDaniel, Jr., 216 Merchants' National Bank Bldg.

Little Rock—Dr. Phil. E. Thomas, Jr., 520 Boyle Bldg.

CALIFORNIA

Bakersfield—Dr. Robert M. Jones, 208 Hopkins Bldg.

Berkeley—Dr. W. F. Hoyt, Medico-Dental Bldg.

Fresno—Dr. D. H. Trowbridge, 719 T. W. Patterson Bldg.

Los Angeles—Dr. Isaac H. Jones, 1920 Wilshire Blvd.; Dr. Theodore C. Lyster, 1920 Wilshire Blvd.

Modesto—Dr. L. D. Mottram, 1007 Tenth St.

Oakland—Dr. Francis M. Shook, Medical Bldg., 1904 Franklin.

Sacramento—Dr. Charles B. McKee, California State Life Ins. Bldg.

San Diego—Dr. Samuel A. Durr, 1304 Medico-Dental Bldg., Third and "A" Sts.

San Francisco—Dr. C. Latimer Callander, 240 Stockton St.; Dr. Benjamin J. Edger, Jr., Schroth Bldg., 240 Stockton St.

Santa Barbara—Dr. Philip C. Means, 103 E. Micheltorena St.

Visalia—Dr. W. C. Zeller, 206 Bank of Italy Bldg.; Dr. C. M. White, 508 Bank of Italy Bldg.

COLORADO

Colorado Springs—Dr. N. W. Woodward, Ferguson Bldg.

Denver—Dr. John S. Chase, 423 Majestic Bldg.

CONNECTICUT

Hartford—Dr. William B. Smith, 410 Asylum St., Capital Bldg., Suite 538.

DELAWARE

Wilmington—Dr. William F. Bonner, 224 Delaware Trust Bldg.

DISTRICT OF COLUMBIA

Washington—Dr. Bernard L. Jarman, the Rochambeau, 815 Connecticut Ave., N. W.

FLORIDA

Jacksonville—Dr. Ralph Greene, 1022 Park St., 303 Wade Bldg.; Dr. A. K. Wilson, 334 St. James Bldg.

Miami—Dr. Thomas W. Hutson, 5 N. E. Second Ave.; Dr. Bascom H. Palmer, 502 Huntington Bldg.

St. Petersburg—Dr. John N. Cooper, First National Bank Bldg.; Dr. W. C. McConnell, Medical Arts Bldg., Seventh Ave., and Eleventh St., N.

Tampa—Dr. S. B. Forbes, 409 Citizens Bank Bldg.

West Palm Beach—Dr. S. Ward Fleming, 119 S. Narcissus; Dr. William Y. Sayad, Harvey, Bldg.

GEORGIA

Atlanta—Dr. David D. Moncrief, 314 Atlanta National Bank Bldg.

Columbus—Dr. Francis B. Blackmar, 408 Woolworth Bldg.; Dr. J. T. Tidwell, 507 Swift Kyle Bldg.

Savannah—Dr. St. J. R. de Caradouc, DeRenne Apts.; Dr. E. Carson Demmond, DeRenne Apts.; U. S. Marine Hospital No. 20, York and Abercorn Sts.

HAWAII

Honolulu—Dr. Clarence E. Fronk, 235 S. Beretania St.; Dr. William H. Wynn, 235 S. Beretania St.

IDAHO

Boise—Dr. Lloyd E. Patrick, 518 Eastman Bldg.; Dr. George H. Wahle, 515 Eastman Bldg., formerly Overland Bldg.

ILLINOIS

Chicago—Dr. August Anderson, 1107 Bryn Mawr Ave., near Broadway; Dr. William P. MacCracken, 24 N. Wabash Ave.; Dr. George W. Woodnick, Pittsfield Bldg., 55 E. Washington St.

East St. Louis—Dr. William L. Hanson, 316 Murphy Bldg., 234 Collingville Ave.

LaSalle—Dr. Walter W. Greaves, LaSalle State Bank Bldg.

Moline—Dr. Chester C. Sloan, Sohrbeck Bldg.

Monmouth—Dr. Harold M. Camp, 203 Lahl Bldg.; Dr. Frank C. Winters, Lynch Bldg.

Peoria—Dr. Fred M. F. Meixner, 827 Peoria Life Bldg.; Dr. Carroll B. Welton, 827 Peoria Life Bldg.

Streator—Dr. Bernard O. Bendixen, 208 East Main St.

INDIANA

Ft. Wayne—Dr. Irving H. Willett, cor. Lafayette and Washington Sts.; Dr. D. D. Johnston, 624 Calhoun St.

Indianapolis—Dr. Wilbur F. Smith, 422 Hume-Mansur Bldg.

Muncie—Dr. Karl T. Brown, 593 Johnson Bldg.

IOWA

Battle Creek—Dr. George A. Hartley; Dr. G. S. Millice.

Cedar Falls—Dr. George E. Hearst.

Cedar Rapids—Dr. Frank P. Riggle, 230 Granby Bldg.

Davenport—Dr. Gordon F. Harkness, 509 Putnam Bldg.; Dr. John I. Marker, 631 Union Bank Bldg.

Des Moines—Dr. J. A. Downing, 417 Bankers Trust Bldg.; Dr. W. W. Pearson, 417 Bankers Trust Bldg.; Dr. E. B. Winnett, 619 Southern Surety Bldg.

Shenandoah—Dr. B. S. Barnes; Dr. J. O. Weaver.

Mason City—Dr. C. E. Chenoweth, Park Hospital; Dr. George M. Crabb, Park Hospital.

Sioux City—Dr. T. R. Gittins, 401 Davidson Bldg.; Dr. John W. Schwartz, 109 Sioux National Bank Bldg.

Woodbine—Dr. Harry N. Anderson, 511 Walker St.

KANSAS

Iola—Dr. O. L. Cox; Dr. O. L. Garlinghouse, 1-2 Garlinghouse Bldg.

Wichita—Dr. C. H. Briggs, 510 Schweiter Bldg.

KENTUCKY

Lexington—Dr. Judd E. Hammond, 31 Guaranty Bank Bldg.; Dr. C. W. Trapp, 306 City National Bldg.

Louisville—Dr. Benjamin D. Choate, 2740 Franklin Ave.; Dr. Gaylord C. Hall, Brown Bldg.

LOUISIANA

New Orleans—Medical Officer in Charge, U. S. Marine Hospital No. 14.

Shreveport—Dr. Dorf Bean, Tri-State Clinic, Medical Bldg., 710 Cotton St.; Dr. R. D. McIntyre, 528 Riccu-Brewster Bldg.

MAINE

Portland—Dr. S. J. Beach, 704 Congress St.

MARYLAND

Baltimore—Dr. J. C. Travers, U. S. Marine Hospital No. 1, Thirty-first St. and Remington Ave.; Dr. H. Roland Carroll, Out-Patient Dispensary, U. S. Public Health Service, Custom House.

Cumberland—Dr. J. Kile Cowherd, Riverside Bldg., 41 Greene St.; Dr. George O. Sharrott, 119 Bedford St.

Hagerstown—Dr. B. B. Kneisley, 122 West Washington St.

MASSACHUSETTS

Boston—Dr. G. Philip Grabfield, 23 Bay State Rd.; Dr. J. Herbert White, 23 Bay State Rd.

Springfield—Dr. Eugene C. Boss, Springfield National Bank Bldg., 1537 Main St.; Dr. Harry F. Byrnes, 67 Chestnut Ct.; Dr. Harold C. Goodwin, 111 Dickinson St.

Worcester—Dr. Earl E. Fipphen, 21 West St.; Dr. William F. Holzer, Medical Arts Bldg., 36 Pleasant St.

MICHIGAN

Detroit—Dr. D. S. Brachman, Addison Hotel, 3101 Woodward Ave., at Charlotte; Dr. J. L. DeRosier, 14793 Kercheval Ave.; Dr. Edgar E. Poos, 26 Waverly at Woodward Ave.

Grand Rapids—Dr. F. C. Warnshuis, Michigan State Medical Society, 1308 G. R. National Bank Bldg.

Jackson—Dr. R. H. Alter, 312 Michigan Ave., W.; Dr. Wayne Cochrane, 312 Michigan Ave., W.

Kalamazoo—Dr. Reader J. Hubbell, 418 S. Rose St.

MINNESOTA

Duluth—Dr. F. W. Briggs, 816 Fidelity Bldg.; Dr. D. D. Murray, 225 Fergusson Bldg.

Minneapolis—Dr. A. J. Herbelsheimer, 323 La Salle Bldg.

St. Paul—Dr. M. A. Shillington, Northern Pacific Hospital, 1515 Charles St.; Dr. Fred R. Haselton, Baltimore Bldg., Seventh and Jackson Sts.

MISSISSIPPI

Jackson—Dr. J. F. Armstrong, Merchants Bank Bldg.; Dr. Victor W. Maxwell, Baptist Hospital.

MISSOURI

Kansas City—Dr. Wade H. Miller, 712 Argyle Bldg.

Marshall—Dr. W. M. Bickford, Marshall Bldg.; Dr. S. P. Simmons, Bank of Marshall Bldg.

St. Joseph—Dr. Charles C. Coats, Moss Bldg., Eighth St. at Edmond; Dr. W. H. Minton, First State Bank Bldg.

St. Louis—Dr. Maurice L. Greene, 311 Metropolitan Bldg.

MONTANA

Billings—Dr. William R. Morrison, 235 Hart-Albin Bldg.; Dr. W. G. Richards, 203 Hart-Albin Bldg.

Butte—Dr. Edward C. Person, 57 W. Quartz St., Murray Hospital.

Glendive—Dr. J. A. Evert, Northern Pacific Hospital; Dr. A. L. Hammerel, Northern Pacific Hospital.

Great Falls—Dr. Iyan A. Allred, Stanton Bank Bldg.

NEBRASKA

Edgar—Dr. C. W. Keith.

Hastings—Dr. Ralph G. Cressman, Nebraska National Bank Bldg.; Dr. E. C. Foote, Foote Bldg.

Lincoln—Dr. Charles H. Arnold, 908 Terminal Bldg.

McCook—Dr. J. Stanley Hill; Dr. Roland R. Reed.

North Platte—Dr. T. J. Kerr, First National Bank Bldg.; Dr. Harold H. Walker, McDonald State Bank Bldg.

Omaha—Dr. J. A. Tamisica, 522 World-Herald Bldg., Fifteenth and Farnam Sts.

NEVADA

Reno—Dr. Arthur E. Landers, 302 Medico-Dental Bldg.; Dr. David Shaw, Medico-Dental Bldg.

NEW HAMPSHIRE

Concord—Dr. Harold J. Connor, 8 N. State St.; Dr. A. L. MacMillan, Jr., 28 S. Main St.

NEW JERSEY

Atlantic City—Dr. Charles C. McGovern, 101 S. Indiana Ave.

New Brunswick—Dr. C. J. Sullivan, 57 Paterson St.; Dr. Howard C. Voorhees, 43 Bayard St.

Paterson—Dr. Louis R. Burnett, City Hall.

NEW YORK

Albany—Dr. A. Wallace Todd, 463 Delaware Ave.

Buffalo—Dr. Edward H. Kraemer, 131 Linwood Ave.; Dr. Otto S. McKee, 131 Linwood Ave.; Dr. Howard Osgood, 131 Linwood Ave.

Hempstead, L. I.—Dr. Luther H. Kice, Professional Bldg.

Ithaca—Dr. Hudson J. Wilson, 156 E. State St.

Jamestown—Dr. John S. Hickman, 706 Hotel Jamestown Bldg.

New York City—Dr. Conrad Berens, 30 East Fortieth St.; Dr. William J. Francis, 121 Madison Ave.; Dr. Ermin L. Ray, 150 W. Fifty-eighth St.

Rochester—Dr. E. S. Ingersoll, 26 S. Goodman St.; Dr. Clarence P. Thomas, 26 S. Goodman St.; Dr. E. W. Kennedy, 282 Alexander St.

Schenectady—Dr. Albert W. Greene, 307 Medical Arts Bldg., 148 Barrett St.; Dr. E. MacD. Stanton, 102 Medical Arts Bldg., 148 Barrett St.; Dr. C. W. Woodall, 102 Medical Arts Bldg., 148 Barrett St.

Syracuse—Dr. Glendon R. Lewis, 545 S. Ave.

Utica—Dr. James W. Fleming, 246 Gene-soc St.; Dr. Walter S. Pugh, 219 Gene-soc St., Clarendon Bldg.

Watertown—Dr. Walter S. Atkinson, 168 Sterling St.; Dr. Walter F. Smith, 185 Stone St.

Wellsville—Dr. Lloyd E. Tefft, 284 N. Main St.

NORTH CAROLINA

Raleigh—Dr. William B. Dewar, 621 Professional Bldg.; Dr. V. M. Hicks, Professional Bldg., 6th floor.

NORTH DAKOTA

Bismarck—Dr. George M. Constans, Quain & Ranstad Clinic.

Fargo—Dr. C. N. Callander, Fargo Clinic.

OHIO

Akron—Dr. J. C. Root, 489 E. South St.

Cincinnati—Dr. J. Harry Schroeder, 11¼ E. Eighth St.; Dr. William J. Topmooler, 577 Doctors Bldg., 19 Garfield Place.

Cleveland—Dr. H. M. Strachan, 1052 Rose Bldg.

Cleveland Heights—Dr. Frederick A. Snyder, 13177 Cedar at Lee Rd.

Columbus—Dr. P. B. Wiltberger, 1271 N. High St.

Dayton—Dr. Alfred G. Farmer, 1040 Fidelity Medical Bldg.

Toledo—Dr. James H. Smith, 606 Euclid Ave.

Youngstown—Dr. John U. Buchanan, 234 N. Phelps St.

OKLAHOMA

Muskogee—Dr. Samuel E. Mitchell, 703 Barnes Bldg., or U. S. Veterans Hospital.

Oklahoma City—Dr. Theodore G. Wails, 902 Medical Arts Bldg.

Tulsa—Dr. James C. Braswell, 708 Mayo Bldg.; Dr. Samuel Goodman, 319 Roberts Bldg.

OREGON

Medford—Dr. Jocelyn J. Emmens, 204 Medford Center Bldg.; Dr. James C. Hayes, Medford Bldg.

Portland—Dr. Ralph A. Fenton, 306 Medical Arts Bldg., Tenth and Taylor Sts.; Dr. William House, 1010 Selling Bldg.

PENNSYLVANIA

Harrisburg—Dr. George L. Laverty, 226 State St.

Philadelphia—Dr. Ben C. Gile, 1906 Chestnut St.; Dr. John V. Allen, Jr., 1516 Harrison St., Frankford, Pa.; Dr. Edward H. Bedrossian, 601 Central Medical Bldg.

Pittsburgh—Dr. George R. Harris, 7133 Jenkins Arcade.

Reading—Dr. W. Wendel Becker, 150 N. Sixth St.; Dr. Solon L. Rhode, 238 N. Sixth St.

RHODE ISLAND

Providence—Dr. William N. Hughes, 112 Waterman St.

SOUTH CAROLINA

Charleston—Dr. Charles W. Kollock, 86 Wentworth St.

Columbia—Dr. Walter Bristow, Medical Bldg.; Dr. F. M. Routh, 1512 Marion St.

Florence—Dr. P. H. Brigham, Public Health Dept.; Dr. S. R. Lucas, 120 S. Irby St.; Dr. M. R. Mobley, 120 S. Ivy St.

Greenville—Dr. Hugh P. Smith, 228½ A N. Maine St.; Dr. J. W. Jervet, Coffey and Church Sts.

Spartanburg—Dr. F. H. Sanders, 110 W. Main St.; Dr. L. Rosa H. Gantt, 404 Andrews Bldg.

SOUTH DAKOTA

Aberdeen—Dr. J. Douglas Alway, 323 S. Lincoln St.

Rapid City—Dr. N. T. Owen, First National Bank Bldg.; Dr. J. M. Walsh, First National Bank Bldg.

Sioux Falls—Dr. Edmund D. Putnam, 800 Citizens National Bank Bldg.

TENNESSEE

Chattanooga—Dr. T. Lyles Davis, Volunteer Life Bldg.; Dr. A. F. Ebert, 504 Volunteer Life Bldg.

Memphis—Dr. John J. Shea, 1018 Madison Ave.; Dr. James B. Stanford, 1052 Madison Ave.

Nashville—Dr. J. B. Hibbits, Jr., 712 Bonnie-Dillon Bldg.

TEXAS

Austin—Dr. C. Hansford Brownlee, 924 Littlefield Bldg.

Dallas—Dr. C. Eugene Morris, 335 Wilson Bldg.

El Paso—Dr. W. R. Jamieson, 921 First National Bank Bldg.; Dr. Franklin P. Schuster, 403 First National Bank Bldg.; Dr. Stephen A. Schuster, 403 First National Bank Bldg.

Ft. Worth—Dr. Thomas J. Cross, 203 Medical Arts Bldg.

Houston—Dr. Louis G. Pawolok, 413 Kross Bldg.

San Antonio—Dr. Eldridge Adams, 528 Moore Bldg.; Dr. W. A. Ostendorf, 528 Moore Bldg.

Waco—Dr. J. Edward Quay, 511 Liberty Bank Bldg.; Dr. Clute E. Rayburn, 514 Liberty Bank Bldg.

UTAH

Salt Lake City—Dr. M. Skolfield, 509 Medical Arts Bldg.

VIRGINIA

Norfolk—Medical Officer in Charge, U. S. Marine Hospital No. 82, Hampton Blvd.

Richmond—Dr. Nelson Mercer, 1100 W. Franklin St.; Dr. R. E. Mitchell, 409 Medical Arts Bldg.

Williamsburg—Dr. P. G. Hamlin, Eastern State Hospital.

WASHINGTON

Port Townsend—Medical Officer in Charge, U. S. Marine Hospital No. 17, Franklin and Quincy.

Seattle—Dr. Leland L. Bull, Stimson Bldg.

Spokane—Dr. E. E. Langley, 515 Old National Bank Bldg.

Wenatchee—Dr. G. Francis Hilton, 423 Savings & Loan Bldg.

WEST VIRGINIA

Huntington—Dr. T. W. Moore, 1050 Fifth Ave.; Dr. W. C. Swann, 622½ Twentieth St.

Wheeling—Dr. E. Lloyd Jones, Wheeling Clinic, Sixteenth and Eoff Sts.; Dr. D. A. MacGregor, Wheeling Clinic, Sixteenth and Eoff Sts.

WISCONSIN

LaCrosse—Dr. E. E. Gallagher, Gateway City Bank Bldg., Fourth and Jay Sts.; Dr. V. Lee Simones, Gateway City Bank Bldg., Fourth and Jay Sts.

Madison—Dr. Albert R. Tormey, 717 Gay Bldg.

Milwaukee—Dr. Gilbert E. Seaman, 407 Wells Bldg., 120 E. Wisconsin Ave.

Racine—Dr. George L. Ross, 203 Hotel Racine.

Superior—Dr. William H. Schnell, Columbia Bldg.; Dr. Frank C. Sarazin, Columbia Bldg.

Wausau—Dr. J. M. Freeman, 506 Third St.; Dr. H. T. Schlegel, 503 Third St.

WYOMING

Casper—Dr. Allen McLellan, Daly Bldg.

Cheyenne—Dr. Walter M. Lacey, 302 Hynds Bldg.; Dr. George L. Strador, 408 Hynds Bldg.

OFFICIAL WORLD AND AMERICAN AIR RECORDS

Established under Rules and Regulations of the
FEDERATION AERONAUTIQUE INTERNATIONALE
JANUARY 1, 1928

WORLD RECORDS

CONFIRMED BY FEDERATION AERONAUTIQUE INTERNATIONALE

AMERICAN RECORDS

CONFIRMED BY CONTEST COMMITTEE
NATIONAL AERONAUTIC ASSOCIATION OF U. S. A.

CLASS A—BALLOONS

GRAND "FREE FOR ALL" RECORD

Duration (Germany)—H. Kaulen, Dec. 13, 1913. 87h.
Distance (Germany)—Berliner, Feb. 8-10, 1914. 3052.7 kms.—1896.9 miles.
Altitude (Germany)—Suring and Berson, June 30, 1901. 10,800 meters—35,424 feet.

Duration—C. B. Harmon, St. Louis to Edina, Mo., Oct. 4, 1909. 48h. 26m.
Distance—A. R. Hawley, St. Louis to Lake Tschotogama., Oct. 17-19, 1910. 1887.6 kms.—1172.9 miles.
Altitude—Capt. Hawthorne C. Gray, at Scott Field, Belleville, Ill., March 9, 1927. 8690 meters—28,510 feet.

FIRST CATEGORY (600 CUBIC METERS)

Duration (France)—G. Cormier, Aug. 10-11, 1924. 22h. 34m.
Distance (France)—Georges Cormier, July 1, 1922. 804.173 kms.—499.69 miles.

Duration—(No Record).
Distance—(No Record).

SECOND CATEGORY (601-900 CUBIC METER.)

Duration (France)—Jules Dubois, May 14-15, 1922. 23h. 28m.
Distance (France)—Georges Cormier, July 1, 1922. 804.173 kms.—499.69 miles.

Duration—W. C. Naylor and K. W. Warren, "Skylark," Little Rock, Ark. to Crawford, Tenn., April 29-30, 1926. 19h.
Distance—W. C. Naylor and K. W. Warren, "Skylark," Little Rock, Ark. to Crawford, Tenn., April 29-30, 1926. 660 kms.—410 miles.

THIRD CATEGORY (901-1200 CUBIC METERS)

Duration (United States)—E. J. Hill and A. G. Schlosser, Ford Airport to Montvale, Va., July 4-5, 1927. 26h. 46m.
Distance (United States)—S. A. U. Rasmussen, Ford Airport to Hookerton, N. C., July 4-5, 1927. 920.5 kms.—572 miles.

Duration—E. J. Hill and A. G. Schlosser, Ford Airport to Montvale, Va., July 4-5, 1927. 26h. 46m.
Distance—S. A. U. Rasmussen, Ford Airport to Hookerton, N. C., July 4-5, 1927. 920.5 kms.—572 miles.

FOURTH CATEGORY (1201-1600 CUBIC METERS)

Duration (United States)—E. J. Hill and A. G. Schlosser, Ford Airport to Montvale, Va., July 4-5, 1927. 26h. 46m.
Distance (United States)—S. A. U. Rasmussen, Ford Airport to Hookerton, N. C., July 4-5, 1927. 920.5 kms.—572 miles.

Duration—E. J. Hill and A. G. Schlosser, Ford Airport to Montvale, Va., July 4-5, 1927. 26h. 46m.
Distance—S. A. U. Rasmussen—Ford Airport to Hookerton, N. C., July 4-5, 1927. 920.5 kms. 572 miles.

FIFTH CATEGORY (1601-2200 CUBIC METERS)

Duration (France)—Georges Blanchet and Dr. Geo. LeGallee, Gordon Bennett, Detroit-Waverly Hall, Ga., Sept. 10-11-12, 1927. 49h.
Distance (United States)—E. J. Hill and A. G. Schlosser, Gordon Bennett, Detroit-Baxley, Ga., Sept. 10-11-12, 1927. 1198.9 kms.—745 miles.

Duration—E. J. Hill and A. G. Schlosser, Gordon Bennett, Detroit-Baxley, Ga., Sept. 10-11-12, 1927. 47h. 55m.
Distance—E. J. Hill and A. G. Schlosser, Gordon Bennett, Detroit-Baxley, Ga., Sept. 10-11-12, 1927. 1198.9 kms.—745 miles.

SIXTH CATEGORY (2201-3000 CUBIC METERS)

- Duration (France)—Georges Blanchet and Dr. Geo. LeGallee, Detroit-Waverly Hall, Ga., Sept. 10-11-12, 1927. 49h.
- Distance (United States)—E. J. Hill and A. G. Schlosser, Gordon Bennett, Detroit-Baxley, Ga., Sept. 10-11-12, 1927. 1198.9 kms.—745 miles.
- Altitude (United States)—Capt. Hawthorne C. Gray, at Scott Field, Belleville, Ill., March 9, 1927. 8690 meters—28,510 feet.
- Duration—E. J. Hill and A. G. Schlosser, Gordon Bennett, Detroit-Baxley, Ga., Sept. 10-11-12, 1927. 47h. 55m.
- Distance—E. J. Hill and A. G. Schlosser, Gordon Bennett, Detroit-Baxley, Ga., Sept. 10-11-12, 1927. 1198.9 kms.—745 miles.
- Altitude—Capt. Hawthorne C. Gray, at Scott Field, Belleville, Ill., March 9, 1927. 8690 meters—28,510 feet.

SEVENTH CATEGORY (3001-4000 CUBIC METERS)

- Duration (France)—Georges Blanchet and Dr. Geo. LeGallee, Gordon Bennett, Detroit-Waverly Hall, Ga., Sept. 10-11-12, 1927. 49h.
- Distance (United States)—E. J. Hill and A. G. Schlosser, Gordon Bennett, Detroit-Baxley, Ga., Sept. 10-11-12, 1927. 1198.9 kms.—745 miles.
- Altitude (United States)—Capt. Hawthorne C. Gray, at Scott Field, Belleville, Ill., March 9, 1927. 8690 meters—28,510 feet.
- Duration—E. J. Hill and A. G. Schlosser, Gordon Bennett, Detroit-Baxley, Ga., Sept. 10-11-12, 1927. 49h.
- Distance—E. J. Hill and A. G. Schlosser, Gordon Bennett, Detroit-Baxley, Ga., Sept. 10-11-12, 1927. 1198.9 kms.—745 miles.
- Altitude—Capt. Hawthorne C. Gray, at Scott Field, Belleville, Ill., March 9, 1927. 8690 meters—28,510 feet.

EIGHTH CATEGORY (4001-5000 CUBIC METERS)

- Duration (France)—Georges Blanchet and Dr. Geo. LeGallee, Gordon Bennett, Detroit-Waverly Hall, Ga., Sept. 10-11-12, 1927. 49h.
- Distance (United States)—E. J. Hill and A. G. Schlosser, Gordon Bennett, Detroit-Baxley, Ga., Sept. 10-11-12, 1927. 1198.9 kms.—745 miles.
- Altitude (United States)—Capt. Hawthorne C. Gray, at Scott Field, Belleville, Ill., March 9, 1927. 8690 meters—28,510 feet.
- Duration—E. J. Hill and A. G. Schlosser, Gordon Bennett, Detroit-Baxley, Ga., Sept. 10-11-12, 1927. 47h. 55m.
- Distance—E. J. Hill and A. G. Schlosser, Gordon Bennett, Detroit-Baxley, Ga., Sept. 10-11-12, 1927. 1198.7 kms.—745 miles.
- Altitude—Capt. Hawthorne C. Gray, at Scott Field, Belleville, Ill., March 9, 1927. 8690 meters—28,510 feet.

CLASS B—AIRSHIPS

RETURNING TO POINT OF DEPARTURE

- Duration (Italy)—Castracane and Castruccio, P-5, June 25, 1913. 15h.
- Distance (Italy)—Castracane and Castruccio, P-5, July 30, 1913. 810 kms.—503.3 miles.
- Altitude (France)—Cohen, at Conte, June 18, 1912. 3080 meters—10,102 feet.
- Duration—Ens. Maytham, Navy A-236, at Miami, Fla., Dec. 24-26, 1918. 40h. 36m.
- Distance—(No Record).
- Altitude—(No Record).

CLASS C—AIRPLANES

RETURNING TO POINT OF DEPARTURE WITHOUT REFUELING

- Duration (Germany)—Edzard and Risetics, Junkers W-33, Junkers L-5, 230 h.p., at Dessau, Aug. 3-4-5, 1927. 52h. 22m. 31s.
- Distance (Germany)—Edzard and Risetics, Junkers W-33, Junkers L-5, 230 h.p., at Dessau, Aug. 3-4-5, 1927. 4660.62 kms.—2895.97 miles.
- Distance (Airlane) (United States)—Clarence D. Chamberlin, Wright-Bellanca, Wright J-5, 200 h.p., Roosevelt Field to Eisleben, Germany, June 4-5-6, 1927. 6294 kms.—3911 miles.
- Altitude (United States)—Lt. C. C. Champion, U.S.N., Wright Apache, Pratt & Whitney "Wasp" Supercharged 425 h.p., at Anacostia, D. C., July 25, 1927. 11,727 meters—38,474 feet.
- Duration—Clarence D. Chamberlin and Bertrand B. Acosta, Bellanca monoplane, Wright J-5, 200 h.p., at Roosevelt Field, L. I., N. Y., April 12-13-14, 1927. 51h. 11m. 25s.
- Distance—Lts. Kelly and Macready, U.S.A. T-2, Liberty 375 h.p., at Wilbur Wright Field, Dayton, Ohio, April 16-17, 1923. 4050 kms.—2516.55 miles.
- Distance (Airlane)—Clarence D. Chamberlin, Wright-Bellanca J-5, 200 h.p., Roosevelt Field to Eisleben, Germany, June 4-5-6, 1927. 6294 kms.—3911 miles.
- Altitude—Lt. C. C. Champion, U.S.N., Wright Apache, Pratt & Whitney "Wasp" Supercharged, 425 h.p., at Anacostia, D. C., July 25, 1927. 11,727 meters—38,474 feet.

Maximum Speed (France)—Warrant Officer Bonnett, Ferbois monoplane, Hispano-Suiza, 550 h.p., at Istres, France, Dec. 11, 1924. 448.171 k.p.h.—278.480 m.p.h.

SPEED FOR SPECIFIED DISTANCES
Without Pay Load

Speed for 100 Kilometers (United States)—Lt. Cyrus Bettis, U.S.A.S., Curtiss R3C-1, Curtiss V-1400, 600 h.p., Mitchell Field, N. Y., Oct. 12, 1925. 401.279 k.p.h.—249.342 m.p.h.

Speed for 500 Kilometers (France)—Sadi-Lecoute, Nieuport-Delage, Hispano-Suiza, 500 h.p., at Istres, June 23, 1924. 306.696 k.p.h.—190.567 m.p.h.

Speed for 1000 Kilometers (France)—Fernand Lasne, Nieuport-Delage 42C-1, Hispano-Suiza, 500 h.p., Etampes, Aug. 29, 1925. 248.292 k.p.h.—154.293 m.p.h.

Speed for 2000 Kilometers (France)—Fernand Lasne, Nieuport-Delage 42C-1, Hispano-Suiza, 500 h.p., Etampes, Sept. 12, 1925. 218.759 k.p.h.—135.930 m.p.h.

CLASS C—WITH USEFUL* LOAD OF 500 KILOGRAMS
(1102.31 lbs.)

RETURNING TO POINT OF DEPARTURE

Duration (Germany)—W. K. Schnabele and Fritz Loose, Junkers W-35, Junkers L-5 engine, 320 h.p., at Dessau, March 21-22, 1927. 22h. 11m. 45s.

Distance (Germany)—W. K. Schnabele and Fritz Loose, Junkers W-35, Junkers L-5 engine, 320 h.p., at Dessau, March 21-22, 1927. 2735.586 kms.—1699.81 miles.

Altitude (United States)—Lt. H. R. Harris, U.S.A.S., U.S.A. TP-1, Liberty 400 h.p., at McCook Field, Dayton, Ohio, May 21, 1924. 8578 meters—28,143 feet.

Speed for 100 Kilometers (France)—Fernand Lasne, Nieuport-Delage, Hispano-Suiza 500 h.p., at Etampes, Oct. 7, 1925. 281.030 k.p.h.—174.622 m.p.h.

Speed for 500 Kilometers (France)—Fernand Lasne, Nieuport-Delage 42C-1, Hispano-Suiza 500 h.p., Etampes, Oct. 7, 1925. 249.618 k.p.h.—155.105 m.p.h.

Speed for 1000 Kilometers (France)—Fernand Lasne, Nieuport-Delage, Type 42, Hispano-Suiza 500 h.p., at Etampes, May 14, 1926. 236.028 k.p.h.—146.660 m.p.h.

Speed for 2000 Kilometers (Germany)—H. Steindorff, Rohrbach-Roland 3 BMW, 230 h.p. ea., at Staaken, July 31, 1927. 205.407 k.p.h.—127.634 m.p.h.

CLASS C—WITH USEFUL LOAD OF 1000 KILOGRAMS
(2204.12 lbs.)

RETURNING TO POINT OF DEPARTURE

Duration (Germany)—Fritz Horn, Junkers G-24, 3 Junkers L-11, 230 h.p. ea., at Dessau, April 4, 1927. 14h. 23m. 45s.

Maximum Speed—Lt. A. J. Williams, U. S. N., Curtiss Racer, R-2-C-1, Curtiss D-12a, 500 h.p., at Mitchell Field, Mineola, L. I., N. Y., Nov. 4, 1923. 429.025 k.p.h.—266.59 m.p.h.

SPEED FOR SPECIFIED DISTANCES
Without Pay Load

Speed for 100 Kilometers, Lt. Cyrus Bettis, U.S.A.S., Curtiss R3C1, Curtiss V-1400, 600 h.p., Mitchell Field, N. Y., Oct. 12, 1925. 401.279 k.p.h.—249.342 m.p.h.

Speed for 500 Kilometers—Lt. Alex Pearson, U.S.A., Verville Sperry R-3, Wright 350 h.p., at Wilbur Wright Field, Dayton, Ohio, March 29, 1923. 270.06 k.p.h.—167.80 m.p.h.

Speed for 1000 Kilometers—Lt. Harold R. Harris, U. S. A., and Ralph Lockwood, DH-4L Liberty 400 h.p., at Wilbur Wright Field, Dayton, Ohio, March 29, 1923. 205.06 k.p.h.—127.42 m.p.h.

Speed for 2000 Kilometers—Lt. Harold R. Harris, U.S.A., DH-4L Liberty 375 h.p., at Wilbur Wright Field, Dayton, Ohio, April 17, 1923. 183.83 k.p.h.—114.22 m.p.h.

Duration—Lt. H. R. Harris, U.S.A.S., Douglas DT-2, Liberty 400 h.p., at Wilbur Wright Field, Dayton, Ohio, June 28, 1924. 9h. 11m. 53.4s.

Distance—Lt. H. R. Harris, U. S. A. S., Douglas DT-2, Liberty 400 h.p., at Wilbur Wright Field, Dayton, Ohio, 950 kms.—590.3 miles.

Altitude—Lt. H. R. Harris, U.S.A.S., U. S. A., TP-1, Liberty 400 h.p., at McCook Field, Dayton, Ohio, May 21, 1924. 8578 meters—28,143 feet.

Speed for 100 Kilometers—R. Lockwood, Army CO-3, Liberty 400 h.p., at Wilbur Wright Field, Dayton, Ohio, June 28, 1924. 180.805 k.p.h.—112.346 m.p.h.

Speed for 500 Kilometers—Louis C. Meister, Martin Bomber, MB-2, 2 Liberty 400 h.p., at Wilbur Wright Field, Dayton, Ohio, June 28, 1924. 120.55 k.p.h.—74.90 m.p.h.

Speed for 1000 Kilometers—(No Record).

Speed for 2000 Kilometers. (No Record).

*Pay load or ballast exclusive of pilot, gasoline and oil.

Distance (Germany)—H. Steindorff, Rohrbach-Roland, 3 BMW 230 h.p. each., at Staaken, July 31, 1927. 2315.338 kms.—1438.680 miles.

Altitude (Germany)—Herman Steindorff, Rohrbach-Roland, 3 BMW 230 h.p. ea., at Staaken, Aug. 12, 1927. 6805 meters—22,326 feet.

Speed for 100 Kilometers (France)—Fernand Lasne, Nieuport-Delage, Hispano-Suiza, 500 h.p., at Etampes, Oct. 16, 1925. 246.440 k.p.h.—153.130 m.p.h.

Speed for 500 Kilometers (Czechoslovakia)—A. Jeseck, Letov S-16, Hispano-Suiza, 450 h.p., at Prague-Nove-Benatky, Oct. 13, 1927. 230.929 k.p.h.—143.492 m.p.h.

Speed for 1000 Kilometers (Germany)—Herman Steindorff, Rohrbach-Roland, 3 BMW, 230 h.p. ea., at Staaken, July 28, 1927. 214.855 k.p.h.—133.504 m.p.h.

Speed for 2000 Kilometers (Germany)—Herman Steindorff, Rohrbach-Roland, 3 BMW, 230 h.p. each., at Staaken, July 31, 1927. 205.407 k.p.h.—127.632 m.p.h.

Distance—(No Record).

Altitude—Lt. H. R. Harris, U.S.A.S., U.S.A. TP-1, Liberty 400 h.p., at Wilbur Wright Field, Dayton, Ohio, May 22, 1924. 5100 meters—16,732 feet.

Speed for 100 Kilometers—(No Record).

Speed for 500 Kilometers—(No Record).

Speed for 1000 Kilometers—(No Record).

Speed for 2000 Kilometers—(No Record).

CLASS C—WITH USEFUL LOAD OF 2000 KILOGRAMS

(4409.24 lbs.)

RETURNING TO POINT OF DEPARTURE

Duration (Germany)—J. Risetics, Junkers G-24, 3 Junkers, 280 h.p., at Dessau, June 29, 1927. 13h. 1m. 12.8s.

Distance (Germany)—Herman Steindorff, Rohrbach-Roland 3BMW, 230 h.p., at Staaken, July 31, 1927. 1750.469 kms.—1087.68 miles.

Altitude (Italy)—Domenico Antonini, Captoni CA-73, 2 Isotta-Fraschini, 500 h.p. ea., at Cascina Malpensa, May 26, 1927. 6262 meters—20,544 feet.

Speed for 100 Kilometers (Germany)—Herman Steindorff, Rohrbach-Roland, 3 BMW, 230 h.p. ea., at Staaken, July 29, 1927. 216.107 k.p.h.—134.28 m.p.h.

Speed for 500 Kilometers (Germany)—Herman Steindorff, Rohrbach-Roland, 3 BMW 230 h.p. ea., at Staaken, July 28, 1927. 215.378 k.p.h.—133.828 m.p.h.

Speed for 1000 Kilometers (Germany)—Herman Steindorff, Rohrbach-Roland, 3 BMW 230 h.p. ea., at Staaken, July 28, 1927. 214.855 k.p.h.—133.504 m.p.h.

Duration—Lt. H. R. Harris, U.S.A.S., and Mechanician Doug. Culver, Barling Bomber, 6 Liberty 400 h.p., at Wilbur Wright Field, Dayton, Ohio, Oct. 3, 1924. 1h. 47m. 10.5s.

Distance—(No Record).

Altitude—Lt. H. R. Harris, U.S.A.S., Barling Bomber, 6 Liberty 400 h.p., at Wilbur Wright Field, Dayton, Ohio, Oct. 25, 1923. 2049 meters—6722 feet.

Speed for 100 Kilometers—(No Record).

Speed for 500 Kilometers—(No Record).

Speed for 1000 Kilometers—(No Record).

CLASS C—WITH USEFUL LOAD OF 5000 KILOGRAMS

(11023 lbs.)

Duration (France)—L. Bossoutrot, Super Farman-Goliath, 4 Farman 500 h.p. ea., at LeBourget, Nov. 16, 1925. 1h. 12m. 21s.

Altitude (France)—L. Bossoutrot, Super Farman-Goliath, 4 Farman 500 h.p. ea., at LeBourget, Nov. 16, 1925. 3586 meters—11,765 feet.

Duration—(No Record).

Altitude—(No Record).

CLASS C—GREATEST PAY LOAD CARRIED TO AN ALTITUDE OF 2000 METERS (6671.7 feet)

L. Bossoutrot, Super Farman-Goliath, 4 Farman 500 h.p. ea., at LeBourget, Nov. 16, 1925. 6000 kgs.—13,228 lbs.

Lt. H. R. Harris, U.S.A.S., Barling Bomber, 6 Liberty 400 h.p. ea., at Wilbur Wright Field, Dayton, Ohio, Oct. 25, 1923. 2000 kgs.—4409 lbs.

CLASS C—REFUELING IN FLIGHT RETURNING TO POINT OF DEPARTURE

Duration (United States)—Lts. Smith and Richter, U.S.A., DH-4B, Liberty 400 h.p., at Rockwell Field, San Diego, Calif., Aug. 27-28, 1923. 37h. 15m. 14.8s.

Duration—Lts. Smith and Richter, U.S.A., DH-4B, Liberty 400 h.p., at Rockwell Field, San Diego, Calif., Aug. 27-28, 1923. 37h. 15m. 14.8s.

RECORDS FOR LIGHT AIRPLANES

CLASS C—1st CATEGORY

Two seaters weight empty less than 400 Kgs.

Distance (Closed Circuit) (Czechoslovakia)—Capt. Vleck and Lt. Bretislav, Christini "Avia" BH-9 monoplane, Walter 60 h.p., at Prague, Dec. 8, 1927. 1305.546 kms.—811.225 miles.

Distance (Closed Circuit)—(No Record).

Distance (Airline) (France)—M. Finat and Madame Finat, Candron 109, Salmson, 40 h.p., at LeBourget-Tempelhof, Oct. 22, 1927. 858.0 km.—539.3 miles.

Distance (Airline)—(No Record).

Altitude (Germany)—Joseph Bohme and Reinhold Lofmk, Baumer B, LV-D1158, Wright L-4, 60 h.p., at Hamburg, Oct. 9, 1927. 5680 meters—18,635 feet.

Altitude—(No Record).

Speed for 100 Kilometers (Germany)—Paul W. Baumer and F. Puls Baumer, Wright 60 h.p., Hamburg-Fuhlsbuttal, July 10, 1927. 191.959 k.p.h.—119.276 m.p.h.

Speed for 100 Kilometers—(No Record).

CLASS C—2d CATEGORY

Single seaters weight empty less than 200 Kgs.

Distance (Closed Circuit) (Hungary)—Chas. Kaszala, Lanipich monoplane, Thorotzkai engine, 18 h.p., at Budapest, Sept. 14, 1927. 650 kms.—403.9 miles.

Distance (Closed Circuit)—(No Record).

CLASS C—3d CATEGORY

Single seaters weight empty 200-350 Kgs. Inc.

Distance (Closed Circuit) (Czechoslovakia)—Capt. Vladimir Cerny, "Avia" BH-11B, Walter 60 h.p., at Prague, Dec. 8, 1927. 1740.728 kms.—1081.634 miles.

Distance (Closed Circuit)—(No Record).

Distance (Airline) (France)—Max Knipping, Candron 109, Salmson 40 h.p., Le Bourget-Kornigsberg, Oct. 30, 1927. 1400.8 kms.—870.3 miles.

Distance (Airline)—(No Record).

Altitude (Germany)—Paul W. Baumer, Baumer, Wright 60 h.p., Hamburg-Fuhlsbuttal, July 8, 1927. 6782 meters—22,250 feet.

Altitude—(No Record).

Speed for 100 Kilometers (Gt. Britain)—Capt. H. S. Broad, DH "Tiger Moth," DH-32 engine, 130 h.p., at Stag Lane, Aug. 24, 1927. 300.1 k.p.h.—186.47 m.p.h.

Speed for 100 Kilometers—(No Record).

CLASS C-2—SEAPLANES

RETURNING TO POINT OF DEPARTURE WITHOUT REFUELING

Duration (United States)—Lts. C. H. Schildhauer and J. R. Kyle, U.S.N., U.S. Navy PN-9, 2 Packard 500 h.p., at Philadelphia, Pa., May 1-2, 1925. 28h. 35m. 27s.

Distance (United States), Lts. B. J. Connell and H. C. Rodd, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., Aug. 15-16, 1927. 2525 kms.—1569 miles.

Distance (Airline) (United States)—Comdr. John Rodgers, U.S.N., and Lt. B. J. Connell, PN-9, 2 Packard 1-A-1500, 500 h.p. ea., San Pablo Bay, Calif. to near Hawaii, Aug. 31-Sept. 1, 1925. 2963 kms.—1841 statute miles.

Altitude (United States)—Lt. C. C. Champion, U.S.N., Wright "Apache," Pratt & Whitney "Wasp," supercharged, 425 h.p., at Anacostia, D. C., July 4, 1927. 11,581 meters—37,995 feet.

Maximum Speed (Italy)—Maj. Mario de Bernardi, Macchi M-52, Fiat 51 engine, at Lido, Nov. 4, 1927. 479,290 k.p.h.—297,816 m.p.h.

Duration—Lts. C. H. Schildhauer and J. R. Kyle, U.S.N., U.S. Navy PN-9, 2 Packard 500 h.p., at Philadelphia, Pa., May 1-2, 1925. 28h. 35m. 27s.

Distance—Lts. B. J. Connell and H. C. Rodd, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., Aug. 15-16, 1927. 2525 kms.—1569 miles.

Distance (Airline)—Comdr. John Rodgers, U.S.N., and Lt. B. J. Connell, PN-9, 2 Packard 1-A-1500, 500 h.p. ea., at San Pablo Bay, Calif. to near Hawaii, Aug. 31-Sept. 1, 1925. 2963 kms.—1841 statute miles.

Altitude—Lt. C. C. Champion, U.S.N., Wright "Apache," Pratt & Whitney "Wasp," supercharged, 425 h.p., at Anacostia, D. C., July 4, 1927. 11,581 meters—37,995 feet.

Maximum Speed (Straightaway)—Lt. James H. Doolittle, U.S.A.S., Curtiss R3C-2, Curtiss V-1400, 600 h.p., Bay Shore, Baltimore, Md., Oct. 27, 1925. 395.439 k.p.h.—245.713 m.p.h.

SPEED FOR SPECIFIED DISTANCES

Speed for 100 Kilometers (Gt. Britain)—Lt. Webster, Supermarine S-5 Napier, 1000 h.p., at Venice, Sept. 26, 1927. 456.522 k.p.h.—283.669 m.p.h.

Speed for 500 Kilometers (United States)—Lt. R. A. Ofstie, U.S.N., Curtiss Navy C-R, seaplane, Curtiss D-12, 450 h.p., at Bay Shore, Baltimore, Md., Oct. 25, 1924. 259.328 k.p.h.—161.14 m.p.h.

Speed for 1000 Kilometers (United States)—Lt. R. Irvine, Vought "Corsair," Pratt & Whitney "Wasp," 425 h.p., at Hampton Roads, Va., May 21, 1927. 210.716 k.p.h.—130.932 m.p.h.

Speed for 2000 Kilometers (Switzerland)—Richard Wagner and Georges Zinsmaier, Dornier "Merkur" BMW, 500-600 h.p., at Altenrhein, Aug. 10, 1927. 172.00 k.p.h.—106.875 m.p.h.

SPEED FOR SPECIFIED DISTANCES

Speed for 100 Kilometers—Lt. G. T. Cuddihy, U.S.N., Curtiss R3C2, Curtiss V-1550, 700 h.p., at Norfolk, Va., Nov. 13, 1926. 388.944 k.p.h.—241.679 m.p.h.

Speed for 500 Kilometers—Lt. R. A. Ofstie, U.S.N., Curtiss Navy C-R, seaplane, Curtiss D-12, 450 h.p., at Bay Shore, Baltimore, Md., Oct. 25, 1924. 259.328 k.p.h.—161.14 m.p.h.

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Speed for 2000 Kilometers—Lts. B. J. Connell and H. C. Rodd, U.S.N., PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., Aug. 15-16, 1927. 126.567 k.p.h.—78.644 m.p.h.

CLASS C-2—WITH USEFUL* LOAD OF 500 KILOGRAMS

(1102.31 lbs.)

RETURNING TO POINT OF DEPARTURE

Duration (United States)—Lts. B. J. Connell and H. C. Rodd, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., Aug. 15-16, 1927. 20h. 45m. 40s.

Distance (United States)—Lts. B. J. Connell and H. C. Rodd, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., Aug. 15-16, 1927. 2525 kms.—1569 miles.

Altitude (United States)—Lt. Geo. R. Henderson, U.S.N., Vought "Corsair," Pratt & Whitney "Wasp," 425 h.p., at Washington, D. C., April 14, 1927. 6760 meters—22,178 feet.

Speed for 100 Kilometers (United States)—Lt. S. W. Callaway, U.S.N., Vought "Corsair," Pratt & Whitney 425 h.p. "Wasp," at Hampton Roads, Va., April 23, 1927. 236.998 k.p.h.—147.263 m.p.h.

Duration—Lts. B. J. Connell and H. C. Rodd, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., Aug. 15-16, 1927. 20h. 45m. 40s.

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*Pay load or ballast exclusive of pilot, gasoline and oil.

Speed for 500 Kilometers (United States)—Lt. J. D. Barner, U.S.N., Vought "Corsair," Pratt & Whitney "Wasp," 425 h.p., at Hampton Roads, April 30, 1927. 218.90 k.p.h.—136.023 m.p.h.

Speed for 1000 Kilometers (Germany)—Geo. Juterbock, Junkers W-34, Bristol Jupiter, 420 h.p., at Dessau, May 11, 1927. 181.447 k.p.h.—112.695 m.p.h.

Speed for 2000 Kilometers (Switzerland)—Richard Wagner and George Zinsmaier, Dornier "Merkur," BMW 500-600 h.p., at Altenrhein, Aug. 10, 1927. 172.00 k.p.h.—106.875 m.p.h.

Speed for 500 Kilometers—Lt. J. D. Barner, U.S.N., Vought "Corsair," Pratt & Whitney "Wasp," 425 h.p., at Hampton Roads, Va., April 30, 1927. 218.90 k.p.h.—136.023 m.p.h.

Speed for 1000 Kilometers—Lt. B. J. Connell and S. R. Pope, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., July 8, 1927. 142.74 k.p.h.—88.69 m.p.h.

Speed for 2000 Kilometers—Lt. B. J. Connell and H. C. Rodd, U.S.N., PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., Aug. 15-16, 1927. 126.567 k.p.m.—78.664 m.p.h.

CLASS C-2—WITH USEFUL LOAD OF 1000 KILOGRAMS (2204.62 lbs.)

RETURNING TO POINT OF DEPARTURE

Duration (United States)—Lts. B. J. Connell and S. R. Pope, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., July 8, 1927. 11h. 7m. 18s.

Distance (Switzerland)—Richard Wagner and George Zinsmaier, Dornier "Merkur," BMW, 500-600 h.p. at Altenrhein, Aug. 8, 1927. 1600 kms.—994.19 miles.

Altitude (Switzerland)—Richard Wagner, Dornier "Merkur," BMW, 500-600 h.p., at Altenrhein, July 18, 1927. 5851 meters—19,196 feet.

Speed for 100 Kilometers (Germany)—John Risetics, Junkers W-34, Jupiter 420 h.p., at Dessau, June 1, 1927. 196.078 k.p.h.—121.836 m.p.h.

Speed for 500 Kilometers (Italy)—A. Pasaleva, Savoia Marchetti, S-62, seaplane, 500 h.p., Isotta Fraschini, at Sesto Calende, (LacMajeur), Dec. 30, 1926. 190.637 k.p.h.—118.455 m.p.h.

Speed for 1000 Kilometers (Switzerland)—Richard Wagner and George Zinsmaier, Dornier "Merkur," BMW, 500-600 h.p., at Altenrhein, Aug. 8, 1927. 175.6 k.p.h.—109.11 m.p.h.

Duration—Lts. B. J. Connell and S. R. Pope, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., July 8, 1927. 11h. 7m. 18s.

Distance—Lts. B. J. Connell and S. R. Pope, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., July 8, 1927. 1525.189 kms.—947.705 miles.

Altitude—Lt. E. E. Dolecek, U.S.N., F-5-L, flying boat, 2 Liberty 400 h.p., at San Diego, Calif., June 7, 1923. 2432 meters—7979 feet.

Speed for 100 Kilometers—B. J. Connell and S. R. Pope, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., July 8, 1927. 148.92 k.p.h.—92.53 m.p.h.

Speed for 500 Kilometers—Lt. B. J. Connell and S. R. Pope, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., July 8, 1927. 145.68 k.p.h.—90.52 m.p.h.

Speed for 1000 Kilometers—Lts. B. J. Connell and S. R. Pope, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., July 8, 1927. 142.74 k.p.h.—88.69 m.p.h.

CLASS C-2—WITH USEFUL LOAD OF 2000 KILOGRAMS (4409.24 lbs.)

RETURNING TO POINT OF DEPARTURE

Duration (United States)—Lts. B. J. Connell and S. R. Pope, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., July 8, 1927. 11h. 7m. 18s.

Distance (United States)—Lts. B. J. Connell and S. R. Pope, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., July 8, 1927. 1525.189 kms.—947.705 miles.

Altitude (France)—Lt. de Vaisseau, Paris, C.A.M.A. 2 Jupiter-Gnome, 480 h.p. ea., at St. Raphael, Aug. 18, 1927. 4684 meters—7538 feet.

Speed for 100 Kilometers (Switzerland)—Richard Wagner, Dornier "Merkur," BMW, 500-600 h.p., at Altenrhein, July 18, 1927. 190.435 k.p.h.—109.112 m.p.h.

Speed for 500 Kilometers (Italy)—A. Pasaleva, Savoia Marchetti, S-55, 2 Isotta-Fraschini, 500 h.p. ea., at LacMajeur, Oct. 19, 1926. 173.567 k.p.h.—107.849 m.p.h.

Duration—Lts. B. J. Connell and S. R. Pope, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., July 8, 1927. 11h. 7m. 18s.

Distance—Lts. B. J. Connell and S. R. Pope, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., July 8, 1927. 1525.189 kms.—947.705 miles.

Altitude—Lts. B. J. Connell and H. C. Rodd, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., Aug. 18, 1927. 2008 meters—6588 feet.

Speed for 100 Kilometers—Lt. B. J. Connell and S. R. Pope, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., July 8, 1927. 148.92 k.p.h.—92.53 m.p.h.

Speed for 500 Kilometers—Lt. B. J. Connell and S. R. Pope, PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., July 8, 1927. 145.68 k.p.h.—90.52 m.p.h.

Speed for 1000 Kilometers (Italy)—A. Pasaleva, Savoia Marchetti, S.55, 2 Isotta-Fraschini, 500 h.p. ea., at Cesto Calende, LacMajeur, Dec. 23, 1926. 166.363 k.h.p.—103,372 m.h.p.

Speed for 1000 Kilometers—Lt. B. J. Connell and S. R. Pope, PN-10, 2 Packard 60 h.p. ea., at San Diego, Calif., July 8, 1927. 142.74 k.p.h.—88.69 m.p.h.

CLASS C-2—SEAPLANES

GREATEST PAY LOAD CARRIED TO AN ALTITUDE OF 2000 METERS (6651.7 feet)

Lts. B. J. Connell and H. C. Rodd, U.S.N., PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., Aug. 18, 1927. 3504 kms.—7726 lbs.

Lts. B. J. Connell and H. C. Rodd, U.S.N., PN-10, 2 Packard 600 h.p. ea., at San Diego, Calif., Aug. 18, 1927. 3504 kms.—7726 lbs.

RECORDS FOR LIGHT PLANES

CLASS C-2—(SEAPLANES) 1st CATEGORY

Two seater weight empty less than 400 Kilograms

Distance (Closed Circuit)—(No Record).

Distance (Airline)—(No Record).

Altitude—(No Record).

Speed for 100 Kilometers—(No Record).

Distance (Closed Circuit)—(No Record).

Distance (Airline)—(No Record).

Altitude—(No Record).

Speed for 100 Kilometers—(No Record).

CLASS G—HELICOPTERS

Distance (Airline) (France)—Pescara, Pescara Helicopter, 2 propellers, Hispano-Suiza, 180 h.p., at Issy-les-Moulineaux, April 18, 1924. 736 meters—2414 feet.

Distance (Airline)—No record.

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