

## APPENDIX

MANUFACTURERS' AIRCRAFT ASSOCIATION, INC.  
501 Fifth Ave., New York, N. Y.

### MEMBERSHIP

Aeromarine Plane & Motor Co., Keyport, N. J.  
Boeing Airplane Company, Seattle, Wash.  
Burgess Company, Marblehead, Mass.  
Curtiss Aeroplane & Motor Corp., Garden City, L. I., N. Y.  
Curtiss Engineering Corp., Garden City, L. I., N. Y.  
Dayton Wright Company, Dayton, O.  
Fisher Body Corp., Detroit, Mich.  
Gallaudet Aircraft Corp., East Greenwich, R. I.  
L. W. F. Engineering Co., College Point, L. I., N. Y.  
Glenn L. Martin Co., Cleveland, O.  
Packard Motor Car Co., Detroit, Mich.  
Sturtevant Aeroplane Co., Framingham, Mass.  
Thomas-Morse Aircraft Corp., Ithaca, N. Y.  
West Virginia Aircraft Co., Wheeling, W. Va.  
Wright Aeronautical Corp., Paterson, N. J.

(The Engel Aircraft Corp., Niles, Ohio; Springfield Aircraft Corp., Springfield, Mass.; St. Louis Aircraft Corp., St. Louis, Mo.; Standard Aircraft Corp., Elizabeth, N. J.; Standard Aero Corp., Plainfield, N. J., have ceased the manufacture of aircraft and withdrawn from the Association.)

### TRUSTEES

Dr. Joseph S. Ames, National Advisory Committee for Aeronautics and member of faculty, Johns Hopkins University.  
W. Benton Crisp, Attorney, New York.  
Albert H. Flint, President, Manufacturers' Aircraft Association.

### DIRECTORS

Albert H. Flint	F. B. Rentschler
C. Roy Keys	J. K. Robinson, Jr.
Glenn L. Martin	Frank H. Russell
F. L. Morse	Inglis M. Uppercu

G. M. Williams

### OFFICERS

President .....	Albert H. Flint
Vice-President .....	J. K. Robinson, Jr.
Secretary .....	Frank H. Russell
Treasurer .....	F. B. Rentschler
General Manager and Ass't Treasurer.....	S. S. Bradley
Director of Information.....	Luther K. Bell

The Manufacturers' Aircraft Association, directly and through its membership, took a leading part during the year in the development of commercial

aeronautics. Its activities were extended, its offices greatly enlarged and connections established abroad.

Feeling that there was a demand as yet ungratified for the further display indoors of military and peace-time aircraft, the Association held one Aero Show in New York and sanctioned and supported a second in Chicago and a third in San Francisco.

The Association's endeavor has been to collect and disseminate accurate information concerning aeronautical needs and progress. To this end its Library has been expanded to include works of general as well as technical reference. A collection of 3000 photographs illustrating the development of the art has been acquired. An index to aeronautical publications throughout the world is distributed weekly. General information is provided municipalities, private companies and individuals regarding air ports and operating problems. Investigation of aerial legislative needs has been carried on and officials of the Association have co-operated in this respect with representatives of the American Bar Association and similar bodies.

#### NEW YORK AERO SHOW.

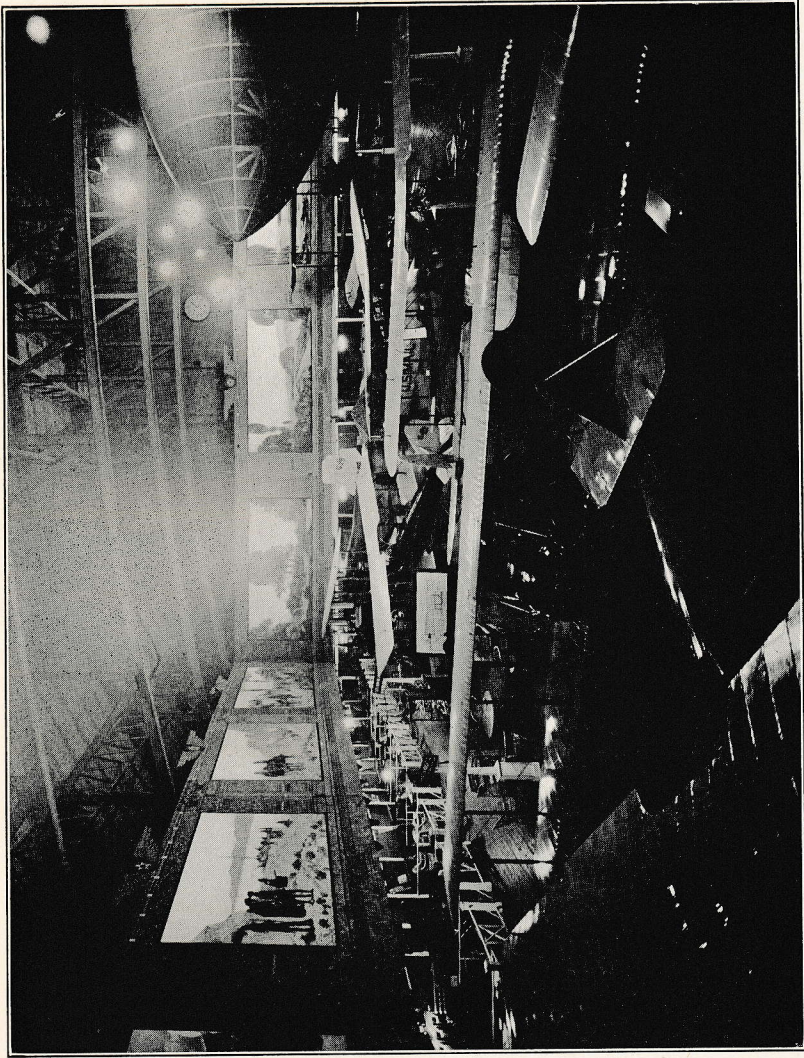
The New York Aero Show was held in the Seventy-First Regiment Armory March 6th to 13th. Whereas the exposition of 1919 afforded the public its first opportunity to see fighting aircraft close-up, the 1920 show featured the post-war commercial types. The spirit of the 1920 exhibit was illustrated by the remarkable decorative scheme. The great floor of the Armory was crowded with examples of freight and passenger carriers. Back and above the display was a series of decorative panels.

A dozen huge canvases depicting the historical crossings of the North Atlantic Ocean and the North American continent enabled the visitor to visualize the development of transportation from the time the Vikings penetrated the fogs of Labrador to the summer of 1919, when the dirigible R.-34 made the round trip from England to America, and from the days of the French Voyagers to the month of October, 1919, when the Army Air Service conducted its Coast-to-Coast Derby.

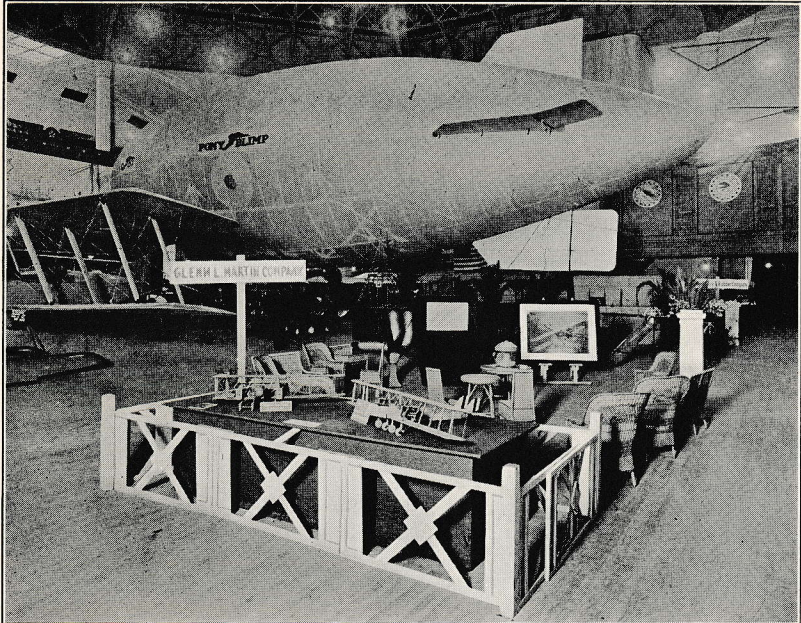
The panels were of such remarkable coloring and real artistic value and were so faithful in depicting historic scenes that, on the conclusion of the San Francisco exposition, whence they were removed from New York, requests were received from museums in various parts of the country for their exhibition as a permanent transportation feature.

The Manufacturers' Aircraft Association was host during the period of the show to representatives of the various Governmental departments, to foreign air attachés and officers and to a special deputation from the Latin-American Republics. Hon. John Barrett, Director-General of the Pan-American Union, sent through the Assistant Director-General, Señor Francisco J. Yanes, this message: "I do not think it any exaggeration to predict that the development of airplane intercourse during the next five years may do almost more than any other influence to promote Pan-American solidarity, build up Pan-American commerce and bring about the best of understanding between the United States and its sister American republics."

Among the distinguished guests of honor on this occasion were: Señor Don Frederico Alfonso Pezet, Peruvian Ambassador to the United States; Señor C. de Quesada, Cuban Vice-consul at New York; Horacio Mira, Chilean Naval Attaché; Comdr. Ambry, Peruvian Naval Attaché; Señor A. Lopez Ulloa, Diplomatic Attaché from Honduras; Dr. Gurzman, Colombian Minister



New York Aero Show, 71st Regiment Armory.



A corner of the Aero Show held in Civic Auditorium, San Francisco.  
*Below—Chicago Aero Show.*

of Finance; General Gomez Mayoral of Colombia, and Señor Don J. E. Lefevre, Minister from Panama.

Days were set aside for military and naval aviation, at which Major General Charles T. Menoher and Brig. General William Mitchell and Captain T. T. Craven and others were guests of honor; for the Air Mail Service and for commercial aeronautics. On the last-mentioned occasion, R. E. M. Cowie, vice-president of the American Railway Express Company, spoke.

### THE EXHIBITS

AEROMARINE PLANE & MOTOR COMPANY — Keyport, N. J. Three units.

*Aeromarine Model 50-B-2 Flying Boat.* Three-place, enclosed cabin, upholstered and trimmed in mahogany.

*Aeromarine Model 40-L Flying Boat.* Two place.

*Aeromarine Model 50 Flying Boat Hull.*

CURTISS AEROPLANE & MOTOR CORPORATION — Garden City, L. I., New York.

*Curtiss "Eagle"* — Second Model, two Curtiss Model K-12 motors, seating ten persons in wicker chairs, all in upholstered cabin. Dual control system.

*Curtiss "Oriole"* — Model K-6 — three place biplane, with Curtiss Model K-6 motor, electric starter.

*Curtiss "Seagull"* — Flying Boat — three place machine, Curtiss Model K-6 motor, electric starter.

*Curtiss JN-4-D* — Two passenger training machine, Curtiss Standard J.I. cross-country or instruction machine.

DAYTON WRIGHT COMPANY — Dayton, Ohio.

*Dayton Wright Model O. W.* — Three place enclosed coupé cabin with baggage accommodation, with Wright or Packard motor.

*Dayton Wright K. T. "Cabin Cruiser"* — Three passenger enclosed cabin, removable seats, with Liberty-12 or Packard-12 motor.

GALLAUDET AIRCRAFT CORPORATION — East Greenwich, R. I.; New York Office, 25 W. 43rd St.

*Gallaudet "Liberty Tourist"* — Five seater, dual social control in rear cockpit, with Liberty 400 h.p. motor.

GOODYEAR TIRE AND RUBBER COMPANY — Akron, Ohio.

*Goodyear Pony Blimp* — Passenger dirigible, with 400 h.p. Ace motor.

L. W. F. ENGINEERING COMPANY — College Point, L. I., N. Y.

*L. W. F. Model H "Giant" Bomber* — With three 12-cylinder Liberty motors, two fuselages 50 feet long, one nacelle, tractor type.

*L. W. F. Model L Butterfly* — One seater sport monoplane with Cato air-cooled motor.

THE GLENN L. MARTIN COMPANY — Cleveland, Ohio.

*Models of the Transport and Mail Planes*, with folding wings.

*Motion pictures* showing operation of Glenn L. Martin factory and various Martin planes in construction and in flight.

ORDNANCE ENGINEERING COMPANY — Baldwin, L. I., N. Y.

*Orenco Type F* — Four seater with Wright motor.

STINSON AEROPLANE COMPANY — Dayton, Ohio.

*Two passenger Stinson airplane.*

THOMAS-MORSE AIRCRAFT CORPORATION — Ithaca, New York.

*M. B.-4* — Two motored plane, tractor and pusher type, with nacelle between two fuselages, powered by two Wright motors.

WEST VIRGINIA AIRCRAFT COMPANY — Wheeling, W. Va.

*Type C* — Three seater airplane, with Wright motor.

## UNITED STATES NAVAL AVIATION

*Model of ZR-2 Hangar, Lakehurst, N. J., Navigating Instruments, etc. Radio exhibit.*

## UNITED STATES AIR SERVICE.

*Model landing field, motion pictures and photographs of U. S. Army Air Service activities, Radio Exhibit operating in conjunction with the Navy.*

## ENGINES

## AEROMARINE PLANE &amp; MOTOR COMPANY—Keyport, N. J.

*Aeromarine Type B Aero Engine, 8 cylinders in blocks of 4; 148 h.p. and 1300 r.p.m.*

*Aeromarine Type L Aero Engine, 6 cylinders, 4 cycles, valve in head, 130 h.p. and 1625 r.p.m.*

## CURTISS AEROPLANE &amp; MOTOR CORPORATION—Garden City, N. Y.

*Curtiss K-12 Aero Engine, 12 cylinder, V type; h.p. 375 at 2250 r.p.m.*

*Curtiss K-6 Aero Engine. 6 cylinders en bloc; 150 h.p. at 1700 r.p.m.*

*Curtiss OX-5 Aero Engine, 8 cylinders, V, 90 h.p. at 1400 r.p.m.*

## HALL-SCOTT MOTOR CAR COMPANY—Berkeley, Calif.

*Hall-Scott L-6 Aero Engine, 6 cylinder, 200 h.p. at 1700 r.p.m.*

## LAWRANCE AERO-ENGINE CORPORATION—New York City.

*Lawrance Air-cooled Aero Motor—Type L-2; 3 cylinders; 60 h.p. at 1800 r.p.m.*

## L. W. F. ENGINEERING COMPANY—College Point, N. Y.

*L. W. F. Cato motor—Two cylinder, 72 h.p. at 1825 r.p.m.; air-cooled.*

## PACKARD MOTOR CAR COMPANY—Detroit, Mich.

*Packard Type 1-A—744 Aero Engine—8 cylinder, 160 h.p. at 1525 r.p.m.*

## WRIGHT AERONAUTICAL CORPORATION—Paterson, N. J.

*Wright Model "E" Aero Engine—8 cylinder, V type; 180 h.p.*

*Wright Model "H"—8 cylinder, V, 300 h.p.*

*Wright Model "K"—8 cylinder; 300 h.p., V type, geared, with 37 mm.*

## ACCESSORIES, ETC.

Valentine and Company (Varnishes), Aetna Life Insurance Company, Brewster-Goldsmith Company (Spark Plugs), Fairchild Aerial Camera Corporation, Liberty Starters Corporation, John A. Roebling & Sons Company (Wire), Stewart Hartshorn Company (Wires), American Propeller Manufacturing Company, Pioneer Instrument Company, U. S. Air Service Magazine, Gardner-Moffat Company (Aeronautical Publications), Tale Spins (Aeronautical Publication), Aerial Age Company (Aeronautical Publication), S. Smith & Sons Company, American Balsa Company (Propellers), American Flying Club, Bureau of Standards, Army and Navy Radio Telephone, E. L. Beecher (Motor).

## CHICAGO AERO SHOW

The Aeronautical Exposition of Chicago was held in the Coliseum from January 8th to 15th, 1920. Several noteworthy events took place during Exposition week. The Mississippi Valley Aviation Clubs Association was organized at a meeting held at the Aviation Club of Chicago, January 13th, and attended by members of the club and others who were interested in aeronautics.

## EXHIBITS

## AEROMARINE PLANE AND MOTOR COMPANY.

*Aeromarine Model 50-B-2.*

## CURTISS AEROPLANE AND MOTOR CORPORATION.

*Curtiss "Eagle."**Curtiss "Oriole"—Model K-6.**Curtiss "Seagull."*

## DAYTON WRIGHT COMPANY.

*Dayton Wright Model O. W.**Dayton Wright K. T. "Cabin Cruiser."*

## WRIGHT AERONAUTICAL CORPORATION.

*Wright Model "E" Aero Engine—8 cylinder V type; 180 h.p.**Wright Model "H" Aero Engine—8 cylinder V type; 300 h.p.*INTER-ALLIED AIRCRAFT CORPORATION. Distributors of Avro airplanes—  
Model 40-4K*Model 50-4K equipped with LeRhone rotary air-cooled, 110 h.p. motor.*

## AMERICAN AIRCRAFT AND SUPPLY WORKS OF CHICAGO.

*Single seater sport plane.*

## GOODYEAR TIRE &amp; RUBBER COMPANY.

*Goodyear Pony Blimp.*

## UNITED AIRCRAFT CORPORATION.

*Canadian Curtiss type.*

## UNITED STATES NAVAL AVIATION.

*Several types of Navy seaplanes and anti-aircraft guns.*

## U. S. ARMY.

*Airplanes and equipment.*

## U. S. AIR MAIL SERVICE.

*First Curtiss J. N.-4 Mail Plane with a record of a full year's service.**This ship was equipped with Wright motor.*

## GALLAUDET AIRCRAFT CORPORATION.

*Exhibit of motors and photographs.*

## PACKARD MOTOR CAR COMPANY.

*Packard Type 1-A—744 Aero Engine—8 cylinder 160 h.p. at 1525 r.p.m.*

## ACCESSORIES, ETC.

Aerial Age Weekly, Aero Club of Illinois, Arthur Johnson Mfg. Company, Aviation Clubs of Chicago, Brewster-Goldsmith Corp., D. G. Cantu (Caproni), Edstrom Machinery Co., Essenkay Products Co., Everyday Engineering Magazine, Floyd Smith Aerial Equipment Co., Gardner-Moffat Co., Inc., Thos. F. Hamilton, Home Insurance Company, Illinois Model Aero Club, John A. Roebling Sons Co., Maurice S. Wetzel, Tale Spins, Whittemore-Hamm Co., Wixon Products, Van Schaack Bros., Chemical Co.

## SAN FRANCISCO AERO SHOW

The San Francisco Aeronautical Show was held in the Civic Auditorium April 21st to 28th. During the week races were held and the Pacific Aeronautical Association was formed, consisting of all the aviation clubs in the Pacific Coast states.

## SUMMARY OF EXHIBITS

AIRCRAFT:—Aeromarine Plane and Motor Company, Continental Aircraft, Inc., Boeing Airplane Company, Curtiss Aeroplane and Motor Corporation and Earl P. Cooper Airplane and Motor Company, Dayton Wright Company, Robert G. Fowler, Goodyear Tire & Rubber Company, Loughead Aircraft Manufacturing Company, The Glenn L. Martin Company, Air Service U. S. Army, United States Naval Aviation, Wright Aeronautical Corporation.

ENGINES:—Aeromarine Plane and Motor Company, Continental Aircraft, Inc., Curtiss Aeroplane and Motor Corporation, Earl P. Cooper Airplane and Motor Company, Hall-Scott Motor Car Company.

MISCELLANEOUS:—Tale Spins (aeronautical publication), John A. Roebing Sons Co., Ace (aeronautical publication), Fred Hartsook (aerial photography), Pacific Aeronautics (aeronautical publication), Pacific Model Aero Club, Pacific Aero Club, Jacuzzi Brothers (propellers).

## SUMMARY OF INDUSTRIAL ACTIVITIES

### AEROMARINE PLANE & MOTOR COMPANY

Sales Offices: Times Bldg., New York City.

Factory: Keyport, N. J.

#### OFFICERS

President .....	I. M. Uppercu
Vice-President & Treasurer.....	John W. German
Secretary.....	E. deB. Newman
General Sales Manager.....	Chas F. Redden
Engineer in charge .....	Paul G. Zimmerman
Acting Plant Manager .....	Ben L. Williams

During the past year the Aeromarine Plane and Motor Company intensified the application of its post-war policy, adopted after the Armistice, which holds in the sentence "To develop marine aircraft for public uses." To answer the demand for a small size flying boat, which would be adaptable to touring purposes in conditions of all comfort, Aeromarine produced in the winter of 1919-20 its Model 50 cabin flying boat. This is a development of the Aeromarine Model 40 which was produced during the war for training. The Model 50 Flying Boat has the same dimensions as the Navy Training Model, its span being 41 feet 6 inches, its overall length 28 feet 11 inches and its maximum height 12 feet 7 inches. Its engine is, however, more powerful, consisting of an Aeromarine Model B-8 water-cooled type, which develops 150 horsepower and gives the flying boat a maximum speed of 75 miles per hour and a climb of 2,200 feet in ten minutes. The capacity of the gasoline tanks is 58 gallons, which affords the Aeromarine Model 50 a radius of operation of 320 miles at full speed. The machine weighs empty 2,375 pounds and carries a useful load of 825 pounds, making a total weight of 3,200 pounds. Instead of being seated in an open cock-pit, the occupants are sheltered against the rush of air and the weather by an enclosed, luxuriously appointed cabin, to which access is had through liberal size side doors. The cabin contains three upholstered seats, the pilot forward and two passengers aft, and affords all the conveniences of a well appointed limousine.

The success which attended the extended operation of the foregoing types prompted Aeromarine to develop a much larger flying boat. With this end in view, the company acquired from the U. S. Navy a number of F-5-L flying boats which formed part of the naval surplus equipment. These were entirely re-fitted. Two comfortable cabins, having a total seating capacity of eleven persons, were fitted forward and aft of the wings, respectively, while the pilot cockpit was placed amidships in a raised position so as to afford maximum visibility.

Although the main effort of Aeromarine was brought to bear on the development of flying boats adapted to public uses, the needs of the U. S.



Navy for specially designed craft were also given careful consideration. As a result a new type of seaplane was produced which is designed to take off from the turrets of a battleship.

The Aeromarine Model A. S. ship's scout is a twin-float, two-seater seaplane. Pilot and observer, the latter also acting as a gunner, sit one behind the other in a narrow, streamlined fuselage just aft of the wings. The pronounced stagger of the wings makes it possible for them not only to see everything above them and thus ward off in time enemy aircraft attacks, but also see ahead and directly downward, which is important for safe landings. Mounted on the rear cockpit is a machine gun which the observer can swing throughout almost an entire hemisphere, thus affording the plane effectual protection. For this purpose the rudder is so designed that no part projects above the fuselage. This makes it possible to fire the machine gun to the rear in the centerline of the craft and eliminates the blind spot which would afford the enemy a safe point for attack. As these types of aircraft are intended for scouting only, they carry no bombs, the purpose of the machine gun being merely to enable the pilot to fight his way through enemy aircraft.

The Aeromarine model A. S. has an overall span of 37 feet 6 inches, an overall length of 30 feet and a maximum height of 11 feet. The total supporting area is 391 square feet. The power plant is a 300 horsepower Wright engine. The high speed of the Aeromarine Model A. S. is about 110 miles per hour, and the landing speed 52 miles per hour, while the climb is 5000 feet in the first ten minutes off the water. The weight of the machine empty is 1743 pounds, the useful load amounts to 987 pounds, making a total flying weight of 2730 pounds.

Perhaps the most outstanding instance of the many and varied activities of Aeromarine during 1920 was the success attending the creation of a new aero engine, called Type U-8D. The U-8D aero engine was specially designed to answer the requirements of commercial and military aviation for a power plant that would combine great sturdiness, dependable operation, low fuel and oil consumption and general accessibility. This engine is of the water-cooled eight cylinder V type, with the cylinder arranged around a common crankcase in two rows of four and having an included angle of 60 degrees. The bore is  $4\frac{1}{4}$  inches and the stroke  $6\frac{1}{2}$  inches, giving a total piston displacement of 737.67 cubic inches. The rated horsepower is 180 at 1750 r.p.m. and the normal brake horsepower 195 at 1750 r.p.m. The fuel consumption is 0.471 pounds per horsepower hour, and the oil consumption is 0.011 pounds per horsepower hour, both at normal brake horsepower. The Model U-8D engine weighs complete with propeller hub and bolts 511 pounds, and with electric generator and self starter 550 pounds.

The tests of this engine from the very beginning have been an unqualified success. The Navy Department put it through the official 50-hour run. It completed the test without grinding valves, cleaning carbon, or disassembly beyond the removal of the valve cover for inspection of the rockers, nor were any spark plugs changed. The last twenty hours of the test were made in a continuous run, at the conclusion of which the motor was disassembled and all parts were inspected. The general condition of the engine was found to be excellent, the remarkable condition of the valves and valve seats and the extremely slight traces of carbon being specially noteworthy. During this test the engine developed over 200 h.p. and its rated speed of 1750 r.p.m. for half an hour, an excess of 11 per cent. over the rated horsepower, while 2000 r.p.m. 220 h.p. was developed.

## BOEING AIRPLANE COMPANY

Plant and General Offices: Seattle, Washington.

## OFFICERS

President .....	W. E. Boeing
Vice-President and General Manager.....	E. N. Gott
Secretary .....	P. G. Johnson
Chief Engineer .....	C. L. Egtvedt

The Boeing Airplane Company by means of its engineering and testing department is keeping pace with new development.

Throughout the year the Company has maintained a flying station at Seattle, and, during last winter, at North Island, San Diego, California, during which time a number of noteworthy undertakings have been carried out, made possible by the stamina and reliability of Boeing Aircraft.

Chief among these may be mentioned the achievement of the first ship built of the B. B.-L-6 type which was the first airplane to fly over the summit of Mount Rainier, 14,400 feet above sea level. An account of this flight will be found in Chapter II.

During the past year the Boeing Airplane Company has remodeled over 110 DeHaviland 4's into the more modern DeHaviland 4-B's. Subsequent to the completion of the DeHaviland contract, the Company was awarded a contract for the manufacture of ten type "G.A.X." armored triplanes for the U. S. Army. This type machine is unique, being, as far as ascertainable, the only armored ground attack machine in the world. The design of these ships was furnished by the Engineering Division of the U. S. Air Service at McCook Field, Dayton, Ohio.

## CURTISS AEROPLANE &amp; MOTOR CORPORATION

General Offices: Garden City, L. I., N. Y.

FACTORIES: —	Garden City Buffalo, N. Y. Waukegan, Ill.
FLYING FIELDS: —	Curtiss Flying Field, Garden City, L. I., N. Y. Kenilworth Field, Buffalo, N. Y. Curtiss Flying Station, Atlantic City, N. J. Curtiss Airport, Atlantic City, N. J. Curtiss Flying Station, Newport News, Va. Curtiss Flying Field, Waukegan, Ill.
SUPPLY AND	Dallas, Tex.
REPAIR DEPOTS: —	Houston, Tex. Sacramento, Calif.
SALES	All parts of United States,
DISTRIBUTORS	South America, and
AND DEALERS: —	The Far East.

## OFFICERS

President .....	C. M. Keys
Assistant to the President.....	C. Roy Keys
Vice-President .....	Frank H. Russell
Secretary and Treasurer.....	J. A. B. Smith

During 1920, the Curtiss Aeroplane & Motor Corporation underwent readjustment and reorganization, the most significant aspects of which were the assumption of the presidency by C. M. Keys, the withdrawal of the Willys motor car interests, and the return of Glenn H. Curtiss to active participation in the management of the company as a member of the Board of directors and chief of engineering. All the operations of the Curtiss Engineering Corp. are carried on as part of the activities of the Curtiss Aeroplane & Motor Corp.

Due to the fact that many machines of Curtiss design and manufacture were available shortly after the signing of the Armistice, much of the commercial activity has been carried on with the assistance of Curtiss products. During the year the company continued the development and production of the three-passenger "Oriole" land plane and three-passenger "Seagull" seaplane, and late in the summer the new single-motored "Eagle" was brought out.

This "Eagle," equipped with a 400 horsepower Liberty engine and capable of carrying ten persons or three-quarters of a ton of freight at the rate of 105 miles an hour for ten hours, was the chief new contribution of the Curtiss Company to commercial aeronautics during the year.

The "Eagle," in test flights made at Garden City, set new records for weight carried per horsepower. Piloted by Bert Acosta, the big machine made several successful flights, carrying aloft a useful load of 3533 pounds which, figured in units of horsepower, amounted to nearly 9 pounds per unit, the greatest carrying capacity, so far as reported, of any machine yet produced.

This machine is adapted to either passenger or freight carrying. Entrance is made through a side door reached by means of disappearing steps. The enclosed cabin compartment is finished in leather with eight individual leather upholstered seats, staggard to permit easy movability; dome lights, curtained windows of celluloid and triplex, giving protection from wind and noise, and at the same time free vision; compartment for luggage to rear of passenger cabin.

The general data on the machine:

Total area including ailerons .....	937.42 sq. ft.	fuselage .....	78 inches
Span of upper wing	64 ft. 4 $\frac{1}{8}$ "	Fuselage is made of	
Span of lower wing	64 ft. 4 $\frac{1}{8}$ "	Curtiss ply wood	
Wing curve .....	U. S. A. 15	construction.	
Chord .....	93 inches	Total gasoline ca-	
Gap .....	93 inches	capacity .....	250 gallons
Stagger .....	0	Motor .....	Liberty 12
Dihedral .....	0	Horsepower .....	400
Angle of incidence.	5 degrees	High speed .....	100 m.p.h.
Length of fuselage.	36 feet	Ceiling .....	16600 feet
Maximum width of		Climb to 5000 feet.	10 minutes
fuselage .....	51 inches	Climb to 10,000 feet	25 $\frac{1}{2}$ minutes
Maximum height of		Gross weight .....	7423 pounds
		Useful load .....	3533 pounds

The reorganization of the Curtiss Company was also marked by the purchase from the Government of Hazelhurst Field adjacent to the Curtiss Plant at Garden City. The Company's policy is to make this new Curtiss Field available as far as possible to the general public. The Aero Club of America has accepted the offer of club quarters and hangar space at the field.

The history of the origin and development of the Curtiss entry for the Gordon Bennett aviation trophy races held in France in September is interesting. Although the two machines which were sent to France met with ill-luck, one being damaged in landing on its way to the starting point, and the other not being completed in time to participate in the races, speed trials at the Curtiss Field with test wings and on the other side with racing wings, stamped the machine as being one of the fastest ever produced.

In March, 1920, a committee of aeronautical men met at a luncheon at the Engineers Club at Dayton, Ohio, at the invitation of S. E. J. Cox, who had entered a machine under the auspices of the Aero Club of Texas, to go over the designs that had been submitted by builders from all parts of America. On June 19, Mr. Cox signed a contract with the Curtiss Company to build a plane capable of developing 200 miles an hour.

On July 25th, the machine was flown for the first time by Roland Rohlfs, Curtiss test pilot, and even with the large testing wings used on account of the unsatisfactory condition of the testing field, the machine attained a speed of 183 miles per hour.

Arriving at France, it was found that, owing to the rough condition of the Etampes field, the starting point of the race, it would be necessary to make certain changes and by dint of working day and night, the machine was completed the day before the race. Inasmuch as it had been necessary to do the testing work at Villacoublay, Rohlfs set out for Etampes, and in landing, he struck a rough spot on the field, the wheels collapsed, and the machine was badly damaged, Rohlfs escaping with minor injuries.

The general specifications and performance data of the Gordon Bennett monoplane:

Gross weight.....	2200 pounds
High speed.....	214 m.p.h. (Estimated)
Total supporting area.....	90 sq. ft.
Span .....	27 ft.
Wing curve .....	c-45
Chord .....	4 feet
Angle of incidence.....	0 feet
Dihedral .....	0
Length of fuselage.....	20 feet
Fuselage made of Curtiss ply wood construction.	
Motor .....	Curtiss C-12,400 h.p.
Gasoline capacity .....	45 gallons

Approximately one year ago, C. W. Webster, in charge of the distribution of Curtiss airplanes and flying boats in Latin-America, left New York with a consignment of planes. Upon arrival he found that British, French and Italian missions had preceded them, and, with the aid of their respective governments, had firmly entrenched themselves in most of the Latin-American countries.

In spite of the handicaps of late arrivals, lack of organization, and limited resources, Mr. Webster succeeded in the year in establishing organizations in four of the countries. Curtiss work in South America is progressing satisfactorily and plans are now being made to expand into other countries.

ARGENTINA. Lawrence Leon is in charge of the work, with headquarters and airdrome at San Fernando, near Buenos Aires. An aviation school is operated and passenger-carrying and cross-country flying services are maintained. Curtiss machines are being used by the Argentine Army and Navy.

**BRAZIL.** Orton W. Hoover is in charge of flying, with Roy Schneider in charge of mechanical operations. Headquarters and airdrome are at Sao Paulo. Curtiss flying boats are used by the Brazilian Navy, and the Sao Paulo Military Police (the only state aviation military police force in the world) are using land machines.

**COLOMBIA.** Knox Martin is in charge, with an airdrome at Bogota.

**PERU.** Curtiss Aviation activities in Peru are under the direction of the Compania Nacional Aeronautica at Lima. An airdrome is in operation at Villa Vista and Curtiss flying boats are a part of the equipment of the Peruvian Navy.

**BOLIVIA.** The Bolivian government purchased a Curtiss "Wasp" for its Army.

Curtiss airplanes and flying boats have played an important part in the aeronautical progress in the Far East. Among the noteworthy accomplishments in the Philippines was a 1100-mile flight made by a Curtis "Seagull," touching the principal islands and cities.

### DAYTON WRIGHT COMPANY

General Offices: Dayton, Ohio.

Plant and Flying Field, Moraine City, Dayton, Ohio.

#### OFFICERS

President .....	H. E. Talbott, Jr.
Vice-President .....	C. F. Kettering
Secretary and Treasurer .....	C. J. Sherer
General Manager .....	G. M. Williams
Chief Engineer .....	V. E. Clark
Consulting Engineer .....	Orville Wright
Works Manager .....	J. P. Henry
Aero Engineer .....	H. M. Rinehart
Production Engineer .....	L. C. Luneke

During the year the Dayton Wright Airplane Company was taken over by the General Motors Corporation. The Dayton Wright Company is still operating in the plant at Moraine City, but is occupying only a portion, the other portion being taken up by the General Motors Research Corporation, this being the centralized experimental department for the entire General Motors Corporation.

Although the company has not put on the market any new models during the year, its engineers have been conducting their experimental work in the endeavor to overcome some of the difficulties now being contended with in commercial aeronautics. The results cannot be made public at this time, but are evidenced in part by the R. B. Monoplane which was the Dayton Wright entry in the Gordon Bennett Race. Practical experimental work of another nature was also carried on with the Dayton Wright K. T. "Cabin Cruiser" and O. W. "Aerial Coupé."

On May 22nd, 1920, a new American altitude record for three passengers and pilot was made in the O. W. "Aerial Coupé." A description of this flight will be found in the Chronology. Considering the comparatively small plant carried in the O. W. (180 h.p. Wright) the height of 19,710 ft. reached indicated that this ship ranks high in general efficiency. While the O. W. is generally a three-place machine, its roomy enclosed compartment easily accommodates four people.

A general outline of the R. B. monoplane entry in the Gordon Bennett Race is as follows: The wing construction is of the cantilever type provided with variable camber which permits of a low landing speed in comparison with the maximum flying speed. The landing gear is so designed that it can be drawn entirely up into the fuselage. It does not have an axle extending from one wheel to the other which permits of taking off on comparatively rough ground. The fuselage is streamlined throughout, the pilot's compartment being entirely enclosed. Vision and entrance is gained on the sides immediately aft of the wing through transparent doors.

The general dimensions, areas, weights, etc., are as follows:

Span .....	21' 2"	Total weight fully loaded .....	1850.00 pounds
Chord at fuselage	6' 6"	Wing loading per sq. ft. ....	18.00 pounds
Chord at tips ...	4' 0"	Weight per h.p. . . . .	7.4 pounds
Overall length ..	22' 8"	<i>Power plant</i> —	
Overall height in line of flight. . .	8' 0"	Motor — Hall-Scott, 6 cyl. ver. water cooled. Develops 250 h.p. at 2200 r.p.m. Weight per h.p. 2.2. lb. Fuel consumption per b.h.p. per hr. ....	.58
Incidence .....	1 degree.	<i>Performance</i> —	
<i>Main Areas</i> —		Landing speed ..	64 m.p.h.
Main wing (including ailerons) .....	102.74 sq. ft.	Cruising radius..	275 miles
Ailerons, rear ...	23.00 sq. ft.	Flight duration..	1½ hrs.
Stabilizer .....	14.6 sq. ft.	Ceiling .....	15,000 ft.
Elevator .....	9.6 sq. ft.		
Rudder .....	7.06 sq. ft.		
Balance of rudder	.85		
Fin .....	3.00		
<i>Weight</i> —			
Weight empty ..	1400.00 pounds		
Useful load .....	450.00 pounds		

While this ship was not successful in bringing to this country the Gordon-Bennett Cup, it is felt that the production of the Dayton Wright racer was a means of bringing forth some distinctive and new ideas in airplane construction which will prove invaluable to commercial aeronautics. Mr. Williams, who headed the party which took the racer to France, later spent many weeks with Dayton Wright engineers investigating the aeronautical situation in Europe.

During the year the Dayton Wright Company has had various other work for the United States Government consisting chiefly of the remodeling of a number of DeHaviland 4's into DeHaviland 4-B's.

#### FISHER BODY CORPORATION

General Offices and Plant: Detroit, Mich.

The Fisher Body Corporation has been inactive in the production of aircraft since the signing of the Armistice.

## GALLAUDET AIRCRAFT CORPORATION

General Offices: 25 West 43rd Street, New York City.

Factory and Engineering Dept., East Greenwich, R. I.

## OFFICERS

Chairman Board of Directors.....	E. F. Gallaudet
President and General Manager.....	J. K. Robinson, Jr.
Vice-President .....	J. G. Crawford
Secretary-Treasurer .....	Wm. B. Lebherz
Assistant Treasurer.....	Wm. H. Thorpe

A summary of Gallaudet activities during the year includes work upon a new series of Government Contracts, consisting of two types of seaplanes and the remodeling of a large number of DeHaviland 4's, a further development and improving of the "Chummy Flyabout" and the development and manufacture of the Gallaudet C.-3 or "Liberty Tourist" for Commercial Flying.

A notable event of the year at this plant was the preparation of the planes to be used on the trip from New York to Nome, Alaska, and return by the U. S. Air Service.

In the development of the C.-3 or "Liberty Tourist" a five-seater Liberty motored biplane, the Engineering Department produced a heavier-than-air machine that is the last word in travel comfort, stability and beauty of outline. Besides a number of novel features, including fire protection, luggage receptacles and convertible cockpit, the "Liberty Tourist" has the following general characteristics:

Weight, including passenger load (5) and equipment, 4675 lbs.	
Spread .....	44' Wing area inc. ailerons.... 548 sq. ft.
Length overall.....	49' 5" Pay load..... 1000 lbs.
Chord .....	8' H. P. loading..... 11.1 lbs.
Gap .....	6' Wing loading..... 8.5 per sq. ft.
Height .....	10' 3" Cruising radius..... 500 miles
Dihedral .....	1½° Estimated ceiling..... 18,000 ft.
Angle of incidence .....	2° Landing speed..... 40 m.p.h.
Wing contour R. A. F....	15 Maximum speed..... 115 m.p.h.
Power Plant, 12 cylinder 400 h.p. Liberty Motor.	

The contracts now in force with the United States Government include the development and manufacture of two types of Seaplanes designated as the D.-9 and D.-11, the former a fighting two-seater biplane, Liberty motored, with guns fore and aft, complete wireless and dual control. The D.-11 a single-seater monoplane, Wright 300 h.p. motor. Fighting equipment. Both types to be equipped with the Gallaudet patent geared propeller. Other contracts are in hand for the manufacture of various types of seaplanes and land machines for private concerns.

Two of the company officials, E. F. Gallaudet and Wm. B. Lebherz, went abroad in the summer of 1920. They spent several months in special aeronautical research.

## THE L. W. F. ENGINEERING COMPANY, INC.

General Offices and Factory: College Point, Long Island, N. Y.

## OFFICERS

President ..... Bradley W. Fenn  
 Vice-President and General Manager..... A. H. Flint.  
 Secretary and Treasurer..... W. N. Bennett

The L. W. F. Engineering Company during 1920 developed its Model H. "Giant" three-motored tractor biplane for the Army Air Service which is using it as a heavy bomber. There were also reconstructed for the Army Air Service and the U. S. Air Mail Service 147 DeHaviland 4 machines including ten twin-motored machines for general utility by the Army and twenty for the Air Mail. Of this production 50 DeHavilands were remodeled for the Air Mail. On these machines are several innovations designed at the L. W. F. factory.

The most important L. W. F. product in 1920 was the "Giant." It is America's largest airplane. It can carry 3000 pounds useful load on long distance flights and on shorter trips 5000 to 6000 pounds. Two great fuselages, 50 feet long, constructed of laminated wood, carry part of the fuel supply and bombs. The crew and controls are located in the nacelle, or tailless body, the central carriage of the plane.

A twelve-cylinder high compression 400 h.p. Liberty motor is set in the nose of the nacelle and one in each nose of the two fuselages, supplying in all 1200 h.p. The wing span is 106 feet from tip to tip. There is accommodation for two pilots, a radio operator and a mechanic. Resting and relief quarters for the crew are installed in the nacelle.

Fully loaded, the plane weighs ten and a half tons. It has a cruising radius of 16 hours at low speed. It lands at 56 miles an hour. The maximum flying speed is 110 miles an hour. With only two of its motors operating it can climb with a full load. Flying at full speed under power from all three motors it can remain in the air 10 hours. Other outstanding features that identify this machine are the monocoque fuselage and nacelle, the intercommunicating gasoline system and the fire extinguisher system. The wing construction is of the Pratt truss type and consists of three upper and three lower panels of 11 ft. chord and equal spans with an 11 ft. gap. Each wing is equipped with balanced interchangeable ailerons. Ribs are built up first and then slipped over the beams which are built up of four pieces, thus forming a hollow box section; the top and bottom are of spruce and the sides of birch. The internal wire bracing is double and of No. 8 solid piano wire and  $\frac{3}{16}$ " hard cable. All external wire fittings are applied directly to the beams and project through the covering.

The fuselages and nacelle are supported between the upper and lower planes on tubular struts which are thoroughly streamlined. Each of the engines is streamlined. The main load and crew are carried in the nacelle while each fuselage carries its complete power plant and has a small auxiliary compartment for express mail or cargo. Each power plant is equipped with Delco ignition, electric starters and compression release. The radiators are above the motors, directly in the blast of the propeller and equipped with individual shutter controls.

The tail is of the biplane type. It consists of two double cambered hori-



zontal stabilizer planes superimposed, with elevators attached and a fin on the top of each fuselage followed by a balanced rudder. A third balanced rudder is installed midway between the two.

The landing gear is of the six wheel, two axle type, with the outer two wheels side by side directly under the center of each fuselage and the other two wheels spaced equally between. The landing gear is so placed that when landing the center of gravity falls sufficiently far back of the wheels to prevent any tendency to nose over.

### SPECIFICATIONS OF THE "GIANT"

#### GENERAL DIMENSIONS :—

Width overall.....	106' 8"
Length overall.....	53' 9½"
Height overall.....	17' 6"
Depth of wing chord.....	11'
Gap between wings.....	11'
Stagger .....	None
Angle of incidence (upper wing).....	4½°
Angle of incidence (lower wing).....	3½°
Backsweep .....	None
Wing curve.....	USA #6

#### AREAS :—

Wings, upper (not including ailerons).....	1000 sq. ft.
Wings, lower (not including ailerons).....	1000 sq. ft.
Ailerons (each 54 sq. ft.).....	216 sq. ft.
Horizontal stabilizer (upper and lower).....	174.4 sq. ft.
Area of vertical fin (each 14 sq. ft.).....	28 sq. ft.
Total area of 3 rudders.....	78.9 sq. ft.
Total supporting area (including ailerons).....	2216 sq. ft.

#### WEIGHTS AND LOADING :—

Net weight (machine empty).....	13,386 pounds
Gross weight (fully loaded).....	21,186 pounds
Useful load.....	7,800 pounds
Loading per sq. ft.....	10.4 pounds
Loading per B. H. P.....	17.6 pounds

#### POWER PLANT :—

Three Liberty 12s (high compression).....	1200 h.p.
Propeller (L. W. F.).....	9' 6" diam., 6' 8" pitch
Rotation of propeller (from pilot's seat).....	Clockwise

#### PERFORMANCE :—

Speed 109 m.p.h. at 6000 ft. altitude.	
High speed.....	110 m.p.h.
Low speed.....	56 m.p.h.
Ceiling .....	15,000 ft.
Climb .....	6,000 ft. in 10 minutes

### THE GLENN L. MARTIN COMPANY

General Offices and Factory: Cleveland, Ohio.

#### OFFICERS

President .....	Glenn L. Martin
Vice-President .....	Lawrence D. Bell

Secretary .....	Thomas H. Jones
Treasurer .....	Roy W. Hine

Since its inception, which was in Los Angeles, in 1912, the Glenn L. Martin Company has had a steady growth. Today, the Glenn L. Martin Company has unfilled orders, both Army and civilian, amounting to nearly \$1,350,000. It employs more men and women than it did during the war, and plans are under way at the present time for the development of commercial aircraft on a considerable scale.

January, 1920, found the Glenn L. Martin Company in production on a Navy contract for ten huge torpedo planes. The Martin Torpedo Plane is essentially a land type, twin-motored, tractor biplane, designed to carry a 2100-pound torpedo (or the equivalent weight in torpedo and bombs) two machine guns complete, radio equipment, a crew of three men (pilot, navigator and gunner) and sufficient fuel for 480 miles cruising radius. It has a wing spread of 71 feet and 5 inches, with an overall length of 46 feet 4 inches, and a height of 14 feet.

This new type of torpedo plane has several recent developments, such as folding wings, which when folded reduce the overall width of the plane to 35 feet 10 inches—thus minimizing the space required for housing. Another new feature is found in the landing gear which is divided in the middle so as to permit the torpedo cradle, capable of carrying a 2100-pound torpedo, to be suspended underneath the fuselage.

In June, 1920, the United States Army placed an order with the Glenn L. Martin Company for twenty bombers of the M. B.-2 type. The Martin Bomber, type M. B.-2, is a special military machine designed for the Army. It is intended to be used for night bombardment and is designed accordingly to carry from 1791 to 3400 pounds of bombs, five Lewis machine guns, flares, night navigation equipment, wireless and interphone outfit, and a very complete set of instruments and accessories. It is equipped with general electric type superchargers, which enable the motors to develop full power to an altitude of 18,000 feet and thereby permit a ceiling of approximately 30,000 feet to be reached.

The gross weight of the M. B.-2 bomber is 12,075 pounds, and the useful load, comprising a crew of three men, gasoline and oil for four hours' flight, complete armament equipment and bomb supply, is 4750 pounds.

The entire bomb load is carried within the fuselage on bomb racks which allow almost two tons of bombs to be carried. This enables the plane, in war service, to make short raids with an exceptionally heavy cargo of explosives.

The two 400 horsepower Liberty Motors can drive the plane 107 miles an hour at sea level and it can climb more than 4,000 feet in ten minutes. The landing speed, with full load, is 60 miles per hour.

From tip to tip, the wing span is 74 feet 2 inches, although this can be reduced to 37 feet 10 inches by folding. The overall length is 43 feet 7 $\frac{5}{16}$  inches, and the height 15 feet 6 $\frac{3}{4}$  inches. The wing chord is 95 inches or approximately 8 feet. The total wing area is 1121 square feet.

In addition to the present Army contract calling for twenty Martin Bombers type M. B.-2, the Glenn L. Martin Company has received up to the present time Government orders amounting to forty-six planes, twenty-six of which have already been put into active service and have made enviable records of performance.

Of the four corps de armée planes built for the Army in 1918, one is in

the Smithsonian Institute at Washington, D. C., while the other three are still in service at various Government aviation fields throughout the U. S. These four planes were undoubtedly the most completely equipped airplanes in existence at that time. In addition to their regular equipment, they carried navigation lights, signal lights and search lights for night landings, land flares, electrically heated flying suits, internal telephonic system for communication between members of the crew, a complete wireless set, and two gun mounts for Lewis machine guns.

Six Martin Mail Planes were built in 1919 for the Post Office Department for use in the Aerial Mail Service between New York and Chicago. The general design of these planes is very similar to the types built for the Army. They carry a supply of fuel for six hours' operation as well as a crew of two men and 1500 pounds of mail, which is divided among five compartments. These planes have established a remarkable record of efficiency in the Mail Service.

Of the ten planes built recently by the Glenn L. Martin Company for the U. S. Navy, the first two were of the M. B. T. type, which is very similar in general design to the original Martin Bombers, with the exception of the divided landing gear. The succeeding eight planes were of the M. T. type, which is a totally new design, the outstanding features being the high left wing section and folding wings. The two 12-cylinder Liberty engines moreover were mounted on the lower wings just outside of the first wing strut away from the fuselage.

The first Martin Bomber Torpedo Plane or M. B. T. type was given its trial flight January 31, 1920, at the Martin airdrome. The naval officials stationed at the Martin Plant considered the trial flight a most unusual success. This same plane was flown from Cleveland to the Naval Air Station at Anacostia, D. C., and has been in constant operation ever since in the experimentation of torpedo dropping.

The second machine of the M. B. T. type was shipped to the Naval Aircraft Factory at Philadelphia, where it was fitted with flotation gears for operation with the Atlantic fleet. The eight remaining M. T. type or Martin Torpedo Planes were divided between the airplane torpedo detachments of the Atlantic and Pacific fleets, four being sent to the Pacific and three to the Atlantic. The remaining one M. T. plane was lent to the Army for experimentation purposes in dropping 1000-pound bombs. It was later ferried to Anacostia for delivery to the Atlantic fleet.

At the present time, the Glenn L. Martin Engineering Department is preparing plans and designs for two distinctly new types of planes; one a four to six passenger small twin engine touring machine, and the other a huge bi-motored commercial plane capable of carrying from 15 to 24 passengers or a cargo of over 3,500 pounds.

#### PACKARD MOTOR CAR COMPANY

General Offices and Plant: Detroit, Mich.

##### OFFICERS

President and General Manager.....	Alvan Macauley
Vice-Pres. in charge of Engineering.....	Col. Jesse G. Vincent
Vice-Pres. in charge of Distribution.....	H. H. Hills
Vice-Pres. in charge of Production.....	E. F. Roberts
Secretary .....	Frank R. Robinson
Treasurer .....	F. L. Jandron

The aeronautical activities of Packard during 1920 have been entirely in charge of the engineering division, and have been devoted to development work for the government. During the year three new airplanes have been successfully completed, which completes the Packard line, so that the company now has engines developing from 125 to around 600 b.p.h. In addition the engineering division has now nearly completed designing a 6-cylinder engine for the U. S. Navy for use in dirigibles.

For use by other than the government, Packard has sold a number of engines with specifications identical with the Liberty. These have been used both for aviation engines and speed boats.

For the government service the most important job has been the development of the 2025 engine. This is a twelve cylinder, V type, engine, producing up to 600 b.h.p. at 2,000 r.p.m. The weight is 1118 pounds, giving 1.94 pounds per horsepower at 1920 r.p.m. It will operate with great economy as low as 1275 r.p.m., giving about 400 b.h.p. It is the largest airplane engine yet designed for quantity production and the most powerful of any except a special racing development.

Among the notable features of the design is the fact that a single duplex carburetor is used, obviating the necessity of synchronizing the four carburetors common on other machines of high power. Another is that all vents are outside the cowling, eliminating fire danger. A third is the extreme ruggedness of the design, which will permit of some 250 flying hours at 1275 to 1350 r.p.m. without overhauling the engine. These engines have been built and delivered to the Engineering Division, U. S. Air Service, McCook Field, Dayton, Ohio.

Packard has also delivered to McCook Field engines of the 1116 type, developed during the year. This engine weighs 820 pounds, and develops from 200 b.h.p. at 1200 r.p.m. to 330 at 2000 r.p.m. It is a twelve cylinder engine of the same general type.

The fourth and smallest engine in the Packard line, which was also perfected during the year, is the 744, an eight cylinder motor. Its weight is 595 pounds, and its power curve runs from 145 b.h.p. at 1200 r.p.m. to 215 at 2000. These also have been delivered to the Airplane Engineering Division at McCook Field.

The engineering department has developed, also, for all the engines, a new type of installation giving greater accessibility, also an electric starter to be attached to the rear end of the engine.

The most notable record made with Packard engines during the year was that for altitude by Major Shroeder, U. S. A., an account of which will be found in the chronology.

#### STURTEVANT AEROPLANE COMPANY

General Offices and Plant: Jamaica Plain, Boston, Mass.

##### OFFICERS

President .....	Noble Foss
Vice-President .....	Benj. S. Foss
Treasurer .....	W. Emerson Barrett
Secretary .....	Horatio Alden

Important research work in the development of the Sturtevant airplane engines has been undertaken and work on the Sturtevant supercharger has

been going forward actively. As a result of protracted tests and experiments, no final design of this supercharger is now ready.

The Sturtevant plant at the time of the Armistice had an organization of more than 1,000 persons, which has since been disbanded.

It is the established policy of the company to hold itself in readiness for production at any time conditions may warrant.

### THOMAS-MORSE AIRCRAFT CORPORATION

Main Office and Plant: Ithaca, N. Y.

#### OFFICERS

President .....	F. L. Morse
Vice-President .....	William T. Thomas
Treasurer .....	Jerome A. Fried
Secretary .....	Raymond Ware
Chief Engineer .....	B. Douglas Thomas

During the year 1920 continued development was carried out on Thomas-Morse types M. B.-3 single seater fighter, M. B.-4 twin engined mail carrier and S.-6 two seater training type.

Type M. B.-4 is believed to have been the first successful twin engined machine produced in this country with pusher and tractor propellers located in a central nacelle. In tests conducted at Ithaca March 1, 1920, witnessed by representatives of the Post Office Department an average speed of 134½ m.p.h. was recorded, and a complete turn and climb to 1,000 feet made with one motor working. A speed of slightly over 100 m.p.h. was made with one motor in operation. Sand loads of 1,200 lbs. in addition to full supply of gasoline, oil, etc., and speeds up to 140 m.p.h. were recorded in level flights.

Continued testing of type M. B.-3 fighter was carried out by the Engineering Division of the Air Service, McCook Field, Dayton, Ohio, and in a number of flights by Lieut. Patrick Logan all manner of aerobatics were indulged in, including zooms from the horizontal to 2,000 feet, spins, rolls, loops, etc., for the purpose of ascertaining the degree of maneuverability of which the machine was capable. The results of these tests proved most gratifying, as the machine controlled perfectly.

For the purpose of ascertaining the suitability of type S.-6 for cross country work, a trip was arranged for Pilot Paul Wilson from Ithaca to Washington, Dayton and return on April 30, 1920, an account of which will be found in the Chronology. The trip was successful in every particular, and demonstrated without question the advantages to be gained by a low landing speed (in this case from 35-38 m.p.h.), as numerous landings were made on fields of inadequate size, poor surroundings and extremely rough surface, especially on the flight from Washington to Dayton. In spite of this, in many cases, getaways were effected without moving the machine from the point where it came to rest after landing. A gasoline consumption of 19 miles a gallon was maintained on the flight from Ithaca to Washington and an average speed of 72.5 m.p.h. with the motor throttled to approximately 75% of its power.

No forced landings were made except one on account of heavy rain; and the final landing on the return to Ithaca was made in almost pitch darkness, at 10:10 P. M., the only aid available being rendered by gasoline flares, which were lit along the sides of the straightaways.

A number of DeHaviland 4's were remodeled during the year by moving the gasoline tanks forward, as well as numerous other changes making for the betterment of the plane.

During the past three months work has been proceeding on small quantity production of type M. B.-3 fighters, a number of which have been ordered by the Engineering Division of the Air Service.

WEST VIRGINIA AIRCRAFT CO.  
Offices: Wheeling, West Virginia.  
Factory: Warwood, West Virginia.

TRAINING SCHOOLS:—Daytona, Florida.  
Princeton, New Jersey.  
Beech Bolton, West Virginia.

OFFICERS

President ..... J. C. McKinley  
Manager ..... C. H. Phillips

The West Virginia Aircraft Company has operated Curtiss J. N. 4-D machines in passenger carrying and instruction at its three fields. Its manufacturing activities have been limited. It has modified a Curtiss J. N. into a three-plane machine, with a 150 h.p. Wright engine. This development has proven very satisfactory.

WRIGHT AERONAUTICAL CORPORATION  
General Offices and Factory: Paterson, New Jersey

OFFICERS

President ..... George H. Houston  
Vice-Pres. and General Manager..... F. B. Rentschler  
Secretary and Treasurer..... James F. Prince

The Wright Aeronautical Corporation in 1920 has consistently improved the design and construction of the Wright engines to maintain its leading position in aviation engine building in the United States. At the same time much thought and energy have been expended on the development of types of engines differing from the Hispano-Suiza type.

A new model of the 180 h.p. Wright engines, known as the E.-2, has been put into production. This model contains several important modifications to increase still further the dependability and ultimate life of this widely used engine. These modifications have also resulted in an increase in power, but with no increase in weight. Plane designers will appreciate the rearrangement of several parts which has been done to facilitate mounting in the plane. This work has been logically developed and carefully executed. Each change has been made only after very thorough study and experiments made to the end that all modifications would improve, letting nothing detract from the performance of this engine.

Orders are now being filled for the new model of the 300 h.p. Wright

Engine, known as the H.-2. This model incorporates some of the changes mentioned in the description of the new E.-2. Dependable and reliable as are these two powerful models, yet by no means are they the full endeavor to improve the aeronautical power plant. Model E.-2 and H.-2 have been built, tested and flown. They accomplished more than was anticipated. On our drawing tables, in the shops and in the test are two really experimental models, whose performance cannot be foreseen. Not a task has been left undone on these two experimental models, so that when completed, we will know conclusively whether or not a Radial Wright Engine is a possibility for aviators to look forward to.

This experimental work on entirely new types of engines, together with the completion of E.-2 and H.-2 models, is so clearly an American product of American designers, engineers and mechanics that it has been decided to drop the foreign type name of Hispano in the Wright Engine Products. Now than the sixth American model, the H.-2, has been completed, retaining only one or two of the original foreign features of design, it appears time also to drop the foreign name and to tell the world these Yankee built and designed engines are from now on to be known under the American name of Wright engines.

To determine the actual dependability of a Wright Engine a novel test was started by the Army Air Service at McCook Field on a model E.-2 Wright engine. The purpose was to determine the length of time the engine could be operated in the air without repairs or overhaul. In order that no particular amount of service or attention should be given to this engine during this dependability test no one was informed that a test or special record was being made. The flights were as called for all in the day's work. At this writing 153 hours have been flown by this engine without one single engine part being replaced or adjusted. Not even a valve has been reground. The mileage flown for this 153 hours is about 14,000 miles. Word has just been received that this dependability test has been finished showing this stock engine to have run 183 hours, covering 16,500 miles without any engine repair. The test was stopped because the plane was to be otherwise used. On examination of the engine all parts were found in splendid condition, and ready for a continuation of the run.

In governmental use the dependability, power and lightness of Wright engines have caused them to be installed in the following planes, the model of the Wright Engine used being indicated by the model letter as "E," "H," "A," or "I."

#### NAVY DEPARTMENT

Vought V. E.-7.....	"E" 2 place Biplane, advanced training.
Loening M. 8-O.....	"H" 2 place Monoplane, Turret Duty.
Loening M. 8-O-S.....	"H" 1 place Monoplane, pursuit Marine Corps.
Loening M. S.....	"H" 2 place Monoplane Seaplane.
Curtiss N. 9-H.....	"A & I" 2 place Biplane Seaplane, Training.
Curtiss C. T.....	2 "H" Torpedo Carrying Seaplane.
Navy T. F.....	2 "H" Tandem Fighting Flying Boat.
Aeromarine A. S.....	"H" 2 place Biplane Seaplane.
Alexandria F.....	"A" 2 place Biplane Flying Boat.

#### WAR DEPARTMENT

Curtiss J. N.-4-H.....	"I" 2 place Training Biplane.
Curtiss J. N.-6.....	"A & I" 2 place Training Biplane.

Vought V. E.-7.....	"I & E" 2 place Advance Training Biplane.
Vought V. E.-8.....	"H" 1 place Advance Training Biplane.
DeHaviland 4-B.....	"H" 2 place Fighter Biplane.
Ordnance Type D.....	"H" 1 place Scout Biplane.
Ordnance Type D.-3.....	"H" Single Seater Pursuit.
Ordnance Type D.-2.....	"H" Single Seater Pursuit.
Ordnance Type H.-2.....	2 "H" (proposed) 3 place Observation Biplane.
Thomas-Morse M. B.-3.....	"H" 1 place Pursuit Biplane.
Thomas-Morse M. B.-4.....	2 "H" Tandem.
Loening M.-8.....	"H" 2 place Pursuit Monoplane.
Army Experimental Uxsbia ..	"H" 2 place Observation Biplane.
Army Experimental S. E.-5-A.	"I & E" 1 place Pursuit Biplane.
Verville V. C. P.-1.....	"H" 1 place Pursuit Plane.
Standard J.-1.....	"I" Training.

#### POST OFFICE DEPARTMENT

Curtiss J. N.-4-H.....	"A & I" Biplane.
DeHaviland 4.....	2 "E" Mail Plane.

Civilian aviators can obtain Wright engines, when desired, in many of the commercial planes, as most of the leading manufacturers have built planes powered with Wright engines. The Service Department of the Wright Aeronautical Corporation is ready to assist on instructions for installation or upkeep of Wright engines in planes. The Engineering Department will very willingly advise plane manufacturers on questions pertinent to power plants required for conditions to be met. All branches of the organization are functioning to maintain the Wright Engines in their present position as the dependable aircraft power plant.

#### WRIGHT MOTORS

MODEL.	"E.-2"	"H.-2"
No. of Cylinders.....	8	8
Bore .....	120 m/m 4.724"	140 m/m 5.511
Stroke .....	130 m/m 5.118"	150 m/m 5.905
Weight complete.....	480 lbs.	620 lbs.
Compressed ratio.....	55 to 1	5.36 to 1
Horsepower guaranteed .....	190	330
R. P. M.....	1800	1900
Oil consumption per h.p. hour.....	.026 lbs.	.022 lbs.
Gas consumption per h.p. hour.....	.48 lbs.	.50 lbs.



## U. S. AIR SERVICE

### LIST OF OFFICERS ON DUTY IN WASHINGTON

#### ADMINISTRATIVE GROUP

NAME.	RANK.	DUTIES.
Menoher, Charles T.	Maj. Gen.	Chief, Air Service.
*Mitchell, William	Brig. Gen.	Asst. Chief of Air Service.
*Frank, W. H.	Major	Acting Executive.
Pearson, W. F.	Major	Administrative Executive on temporary duty at Ft. Omaha.
*Simons, J. W., Jr.	Major	Acting Administrative Executive and Asst. to Administrative Executive.
Trabold, A. R.	Captain	Chief, Miscellaneous Div., Administrative Group.

#### PERSONNEL DIVISION

Lincoln, Rush B.	Major	Chief, Personnel Division.
Milledge, John	Captain	Chief, Enlisted Section, Personnel Division.
Sorenson, Edgar P.	1st Lieut.	Asst. to Chief, Enlisted Section.
York, A. C.	Captain	Chief, Officers' Section, Personnel Division.
Sigourney, H. C.	Captain	In charge of Discharges, office of Chief, Officers' Section, Personnel Division.
Hopkins, H. V.	1st Lieut.	In charge of Reserve Commissions and Liaison Officer between General Staff and Office, Chief of Air Service, Reserve Commissions.
Reading, W. M.	Captain	Chief, Civilian Sec., Personnel Division.

#### OFFICE, CHIEF SUPPLY GROUP

Gillmore, Wm. E.	Lt. Col.	Chief, Supply Group.
*Robins, Augustine W.	Major	Asst. to Chief, Supply Group.
Ralph, Edward J.	Captain	Asst. to Chief, Requirements Division and Supply Group Personnel Office.

#### PROPERTY DIVISION

*Brett, George H.	Major	Acting Chief, Property Division.
Christine, Frederick F.	Captain	Transportation Officer; Records and Statistics.
Knight, Climpson M.	1st Lieut.	Operating Costs, Buildings & Grounds; Asst. to Lieut. Williams.
Page, Edwin R.	1st Lieut.	New Projects, Property Specialists.
Puryear, Alfred I.	1st Lieut.	Handling the abandonment of Fields; Asst. to Capt. Christine.

\*Pilot.