AIRCRAFT YEAR BOOK

1923

AIRCRAFT YEAR BOOK, 1923

SOCRATES ON HUMAN FLIGHT

On the day he drank the hemlock (B. C. 399) Socrates, in conversation with friends who called on him in prison, said:

". . . . we are dwelling in a hollow of the earth, and fancy that we are on the surface; and the air we call the heaven, and in this we imagine that the stars move. But this is also owing to our feebleness and sluggishness, which prevent our reaching the surface of the air; for if any man could arrive at the exterior limit, or take the wings of a bird and fly upward, like a fish who puts his head out and sees this world, he would see a world beyond; and, if the nature of man could sustain the sight, he would acknowledge that this was the place of the true heaven and the true light and the true stars."

Four Miles a Minute—Curtiss-Army Racer.—Photo, J. A. Davis, N. Y. C.

AIRCRAFT YEAR BOOK

1923

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INTRODUCTION

The Editors of the Aircraft Year Book are deeply indebted to the officers and personnel of the Information Divisions of the U. S. Air Service, Navy Bureau of Aeronautics and Air Mail, without whose assistance compilation of this volume would have been extremely difficult. Data and suggestions provided by these services, together with material from the Automotive Division, Bureau of Foreign and Domestic Commerce, and the National Advisory Committee for Aeronautics, combine to make the Aircraft Year Book for 1923 the most comprehensive and authoritative publication yet issued concerning aeronautics. In preparing the review of activities in foreign countries, invaluable help was provided by the American Air, Military, Naval and Commercial Attachés abroad, and the Foreign Air Attachés accredited to the United States Government. The Chapter on Technical Developments in Aircraft Construction in 1922 was contributed in its entirety by Dr. George W. Lewis, Executive Officer, National Advisory Committee for Aeronautics, and the Chapter on Motorless Flight by M. W. Royse, who witnessed the soaring flight contests in France, Germany and England and reported them for the Aeronautical Chamber of Commerce.

AERONAUTICAL CHAMBER OF COMMERCE OF AMERICA, INC.

New York City, May 10, 1923.

CHAPTER I

AVIATION THE PIVOT OF WORLD POLICY—ECONOMIC AND MILITARY

AVIATION in 1922 became the pivot of world policy—economic and military. Universally recognized at the close of the Great War as the key to future conflicts on land and sea, it was also conceived as offering distinctively constructive services in peace. The result has been that, in one form or another, the art has been involved in governmental problems among the major nations and its military or commercial utility accentuated according to the underlying motive.

There has been an impression that progress in aviation in America has been less than that abroad, and foreign press reports go far toward confirming this opinion. Nevertheless, analysis of the aeronautical survey embracing nearly three-score nations, as presented in this volume, establishes the conviction that the American public, by regarding aviation in its true character—that of a beneficent servant of mankind—proposes that our aircraft industry be placed upon a substantial basis, thus assuring the future of flying as an indispensable factor in our economic growth and in the security of the republic.

AVIATION—SERVANT OR MASTER?

The difference between aviation in the United States and in certain of the countries of Europe is this: Beginning with the primary conception of aircraft and their immediate necessity as engines of destruction, the governments of France, Great Britain, Italy, Russia and Germany, among others, have devoted their main energies toward the creation of military aeronautical establishments, out of which have grown commercial activities of impressive scope but essentially insecure nature due to their artificial stimulation by means of subsidies.

The United States, while recognizing the aerial arm as essential, has, since the Armistice, reverted to its traditional non-military outlook upon world affairs and has turned its attention to domestic problems, among which is that of co-ordinating and developing all forms of transportation. Thus American aviation, though it has been deprived to a large extent of the nourishment of military

appropriations, and though it has lacked the fundamental assistance conferred by a Federal Air Law, finds itself today favorably regarded by the general public as an art desirable because it is useful and by the transportation leaders because it offers hope of relieving them of unprofitable excess-speed traffic.

Why Europe Has Made Progress

The effect of these sharply contrasting conceptions has been manifested as follows:

Germany, while theoretically disarmed and deprived of the privilege of extensive aeronautical manufacture or operation, has actually stimulated engineering and design and has temporarily transferred to other soil—notably Russian, Swiss and Italian—fabrication or assembly forbidden by the Treaty of Versailles.

France, fearful even in the moment of victory that the enemy had not been destroyed, interprets German ingenuity as a threat of retaliation and accordingly has made the Air Force the nucleus of its entire scheme for national defense, providing the equivalent of 7,500 aircraft. American observers, both military and civil, unite in declaring France to be *"Master of the Air,"* and the dozen or more commercial lines radiating from Paris, each the recipient of generous State grants, to be in effect operating reserves instantly available for service.

England, loyal to France as an Ally, yet commercially desirous of seeing Germany restored as a producing and trading nation, has been unwilling to develop its Air Force at the cost of economic improvements and has made attempts to approximate the establishment of aviation upon a commercial basis, conscious, nevertheless, that subsidies given operators must, in turn, benefit the aircraft industry, which has been consistently recognized by the various Secretaries of State for Air, as essential to Imperial defense.

Italy, registering economic recovery, but greatly disturbed at the rising tide of Ottoman power following the Greek disaster in Asia Minor, set about a definite positive aviation policy under the new premier, Mussolini, the substance of which is the control of the air routes over the Mediterranean and Adriatic.

Russia, whose liaison in matters aeronautical with Germany has caused much speculation, late in the year announced its entrance into the air. "We will build up a strong air force," Minister of War Trotzky is quoted as saying, "and conquer the air as we have conquered the ground we are standing on."

The policies followed by these nations and emulated by others less active are, in varying degree, the following:

1. Continuation of the aircraft industry created during the war.
2. Adoption of the principle of non-competition between the Government and industry.
3. Appropriation of liberal sums for aircraft and engine construction.
4. Granting of subsidies to commercial operators of "approved" aircraft upon "approved" routes.
5. Enactment of national air law, providing among other things for the registration of pilots, certification of machines, establishment of terminals and designation of routes.
6. Encouragement of aircraft exports by means of aviation missions.
7. Establishment of air mail lines.

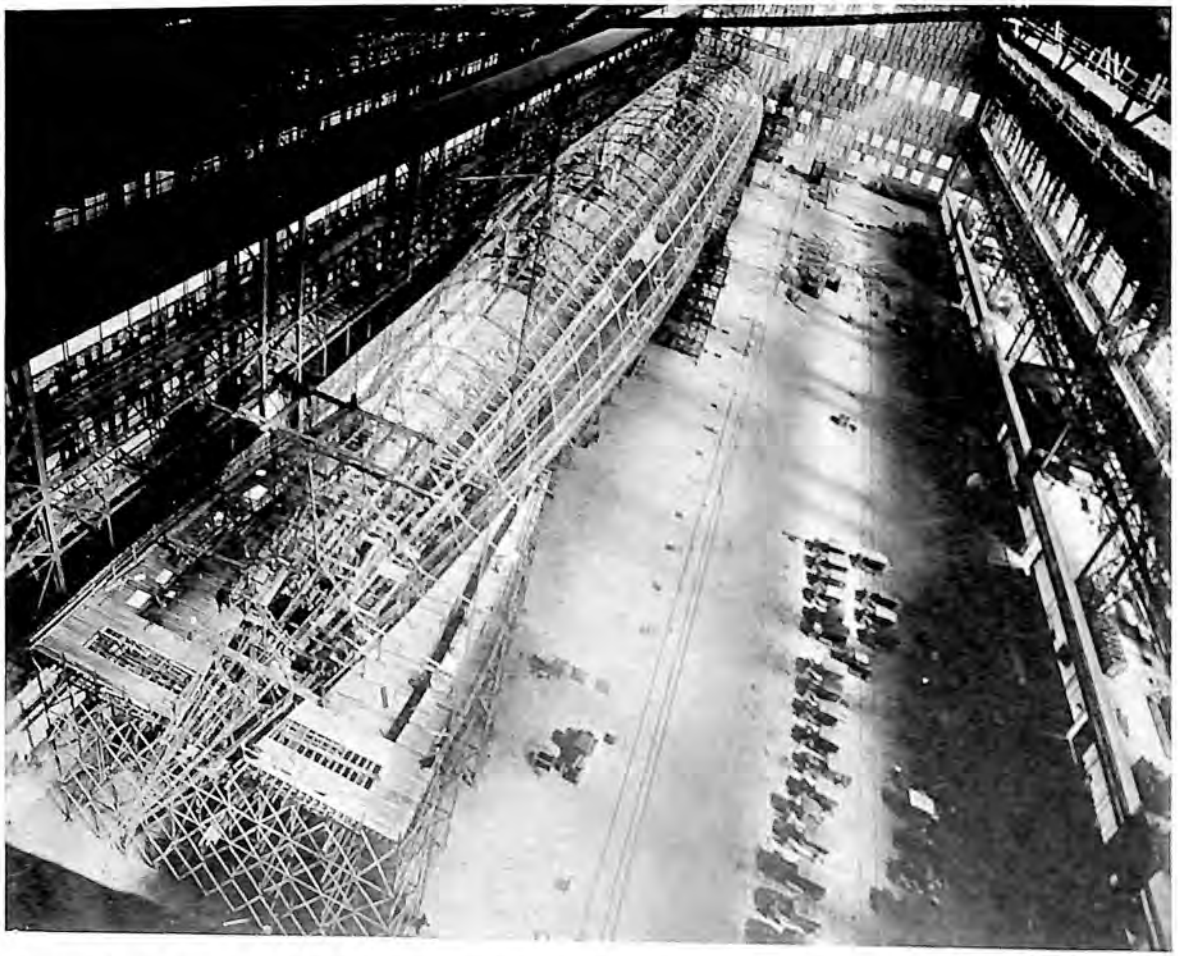
In Chapter IX of this volume will be found a detailed narrative of each country's aeronautical activities. In all of the major nations, largely due to the first three steps enumerated, the aircraft industry is thriving and commercial operation flourishing, as is seen by the following:

AIR LINES OF THE WORLD (EXCLUSIVE OF THE UNITED STATES)

Controlling or Operating Nation	*Route*	*Reported Subsidy*
Algiers (France)	Algiers-Biskra	1,000,000 francs (total)
	Oran-Casablanca	Military
Argentina	Bermejo River (Parana Junction)—Presidente Roca;	
	Buenos Aires-Montevideo	$1700
Australia (British Empire)	Charlesville-Glencarry;	£12,600
	Geraldton-Derby	£25,000
Brazil	Rio de Janeiro-Porto Alegre	Heavy
China	Peking-Paitaiho	
Colombia	Barranquilla-Girardot	$100 a trip
Czecho-Slovakia	Prague-Constantinople	6,500,000 ck.
Denmark	Copenhagen-London	100,000 crowns
Egypt (British Empire)	Cairo-Bagdad-Palestine	Military
Esthonia	Stockholm-Riga-Petrograd	
Finland	Helsingfors-Reval-Stockholm	
France	Antibes-Ajaccio-Bizerte	Total 45,382,000 francs
	Antibes-Tunis	
	Bayonne-Bilboa-Santander	
	Bordeaux-Toulouse-Montpelier	
	Dakar-Kayes	
	Lyons-Geneva	
	Montpelier-Marseilles-Genoa	
	Paris-Brussels-Amsterdam	
	Paris-Havre	
	Paris-London	
	Paris-Marseilles	
	Paris-Strassbourg-Prague-Warsaw	
	Paris-Warsaw-Prague-Budapest-Bucharest-Constantinople	

Controlling or Operating Nation	*Route*	*Reported Subsidy*
France (Continued)	Saint Laurent-Cayenne	
	Saint Laurent-Inimi	
	Toulouse-Rabat-Casablanca	
Germany	Berlin-Bremen	22,000,000 m'rks (total); 10 marks per km. up to 300 km.; 11 m'rks above 300 km.
	Berlin-Hanover-Magdeburg-Leipsic-Dresden	
	Berlin-Leipsic-Fuerth (Stuttgart)-Munich-Augsburg	
	Berlin-Moscow	
	Berlin-(Hamburg)-Stettin-Danzig-Koenigsberg-Kovno-Riga	
	Bremen-Amsterdam-Rotterdam	
	Bremen-Wangeroog-Norderny	
	Copenhagen-Hamburg-Berlin-Dresden	
	Danzig-Koenigsberg-Memel-Riga	
	Fuerth-Nurnberg-Geneva	
	Hamburg-Westerland	
	Munich-Constance	
	Travemunde-Warnemunde-Sassnitz-Swinemunde	
Guiana (France)	Up Marowyne River	£200,000 (total)
Great Britain	London-Brussels-Cologne	£25,000
	London-Paris	£15,000
	Manchester-London-Amsterdam	£55,000
India (British Empire)	Bombay-Calcutta-Rangoon	Military
Japan	Tokio-Kouchow	30,000 Yen (total) money grants and equipment
Netherlands	Amsterdam-London	325,000 florin
	Amsterdam-Paris	
	Amsterdam-Rotterdam	
Poland	Danzig-Warsaw-Bucharest	Free terminals and fuel
	Warsaw-Paris	
Spain	Barcelona-Palma de Mallorca	$235,000 (total) free terminals, hangars, etc., and 60 pesetas per km.
	Madrid-San Sebastian	
	Seville-Larache	
Sweden	Copenhagen-Warnemunde	500 kr. every mail flight
	Gothenburg-Malmo	
	Stockholm-Gothenburg	
	Stockholm-Mamlo	
Switzerland	Lausanne-Paris	$7,000 150,000 francs (total)

This unusual photograph of New York taken from the North, has been of extreme interest to City Plan Engineers throughout the Country, of their study of congestion in cities, due to the concentrated building of skyscrapers.—Photo, Fairchild Aerial Camera Corp.



General view of ZR-1. An indication of its gigantic size may be had by comparison with motor cars.
—Official Photo, U. S. Navy.

Air Mail and Air Law

In Algiers, Argentina, Australia, China, Colombia, Denmark, Egypt, France, Germany, Great Britain, Hungary, Italy, India, Mesopotamia, Mexico, Netherlands, Poland, Spain, Sweden and Uruguay attempts have been made in the transportation of mail by air either by the military service or by the heavily subsidized private operating organizations.

Forty nations of the world, ranging in importance from Great Britain and France to the humblest dependencies, have enacted some form of air law, the statutes being predicated in most instances upon the Convention for the Regulation of International Air Navigation.

Exploiting Foreign Aircraft Markets

In all of the countries pursuing a primary military aviation program, the burden of appropriations necessary to sustain an artificially stimulated aircraft industry is becoming onerous and attempts are being made to shift some of these expenses to other nations by means of the export trade. The theory is simple and, from the viewpoint of the manufacturing country, quite sound. Aviation is vital; the aircraft industry is indispensable; in the direct proportion that sales of aircraft are made to less ambitious and far-sighted governments, will the home industry prosper and the home government be relieved of a part of its expense and at the same time be provided with a producing industry.

From the world review it is seen that France, by means of consular agents, but more especially through flying missions, has drummed up aeronautical business in Africa, Belgium, Bolivia, Brazil, Czecho-Slovakia, Ecuador, Finland, Gambodia, Guatemala, Japan, Korea, Mexico, Paraguay, Persia, Poland, Rumania, Siam, Spain, Switzerland, Turkey, the United States and Venezuela. At the time of publication a French flying mission is engaged in a world tour, literally carrying samples to their customers.

It is astounding to learn (at the time of publication) that Germany, with marks at 50,000 to the dollar, still finds enough gold to carry on lively commercial proselyting in Brazil, China, Colombia, Cuba, Czecho-Slovakia, Denmark, England, Esthonia, Italy, Japan, Lithuania, Paraguay, Russia, Spain, Switzerland and the United States. German planes, manufactured since the armistice, are in operation; German scientific and technical skill is at the service of the purchasers and a consular agent in at least one ascertained instance is doubling as an aircraft operator and manufacturers' agent and as the accredited representative of his country.

Great Britain has not been too deeply involved in Irish and Turkish problems to neglect the aeronautical market in Argentina, Chile, China, Turkey, Japan, Lithuania, Rumania and the United States. The British consular agent, as is proper, has a good eye to business and the attempt, several years ago, to dump into the United States some thousands of planes and motors from the British war surplus has by no means been abandoned as hopeless.

Italy, like France, has had sufficient faith in its machines to fly them for its foreign customers. So Italian planes are operating today in Argentina, Costa Rica, Ecuador, Finland, Japan and Paraguay, not to mention the United States.

National Security in Economic Resources

It requires only the briefest review of the few wars, in which the United States has engaged, to support the assertion that we have never prepared for a war until we found ourselves at war. One of the lessons which our military leaders learned from the World War was that, if we are not to pay heavier in lives and treasure in the future we must prepare, not by the hoarding of gold, the accumulation of vast navies, fleets of aircraft or huge standing armies, but by the intelligent inventory of economic resources so that the machinery of peace can be quickly applied to the defense of the nation.

It was in response to the plan as outlined by Secretary of War Weeks that Assistant Secretary of War Wainwright, just before his resignation to enter Congress, reported:

"The Army Air Service is faced with this condition of affairs: Its war-time manufactured equipment has been practically used up. The amounts of money appropriated for new aircraft are so small that within two years it will have on hand less than one-half the number of aircraft necessary for its normal peace-time emergency, no reserve on hand, and it will be impossible in less than a year to expand the remnant of the aircraft industry which may be left or to create it anew so that this material can be manufactured in sufficient quantity for use in such an emergency. This situation is not only serious, but it is actually alarming. As an economic measure and likewise in the interest of national preparedness, the aeronautical industry in this country should be maintained in such condition that it can supply our peace-time needs and be prepared to expand adequately to meet a war-time demand."

At about the same time, Secretary of the Navy Denby, writing in U. S. Air Service Magazine, declared:

"The aircraft industry which was necessary to supply the urgent requirements of the last war will be equally necessary if another such emergency should arise; its creation would result in an equal or even greater expendi-

ture; and time would, in all probability, be a more vital factor in national safety. And yet this serious condition could easily come about lacking the conditions that are requisite to sustain the aircraft industry in time of peace on a basis which would render it available in time of war for military production."

The President on Aircraft in Peace

The presidential messages and the various departmental reports, reflected in the actions of the chiefs of the Army and Navy Air Services, indicate that the foregoing policy has been the subject of many cabinet discussions and may justly be regarded as the policy of the administration, which recognizes its obligations in national preparedness. And yet this conception, which is essentially military, visualizing aircraft as engines of destruction, does not wholly portray the situation.

On June 23rd, President Harding, in a letter to the Aeronautical Chamber of Commerce, said:

"I find pleasure in adding a word expressive of my interest in aerial transport, and in the presentation of the subject which is being made by the Aeronautical Chamber of Commerce. The history of civilization is largely the history of communication. Each stage of progress seems to demand and develop improved means of transport. The steamship, the railroad and the motor car have been devised and utilized. Now we enter a new phase. It is a real distinction to America to be known as the birthplace of the airplane; it should be our concern that this art shall not languish, but that in its practical application we shall lead the world. An amazing development will take place in the near future in the utilization of the air as a medium of transport and communication. As a government we are aiming to provide this art with necessary guaranties of law, and with such facilities as may be possible through the encouragement of airways and terminals. But for air transport quickly to achieve the important place it is destined to occupy, it must have public interest and support, and I hope your efforts in this behalf may be productive of most gratifying results."

The President sees in aerial transport the medium through which the human race may attain to a higher civilization, best promoted through communication and the interchange of friendly ideas. It is this idea—aircraft as a beneficent servant—which the Aeronautical Chamber of Commerce conceives as the only safe guide to the permanent development of American aviation. The perversion of this view—aircraft grappling in the skies or raining death upon noncombatants—means a threat to civilization and as such should never be permitted to develop.

But so long as evil or fearful minds in other nations regard the air as battle space instead of a commercial highway, it would be folly to neglect to do all things which are necessary, not only for the protection of one's country, but for the protection of aviation

itself. Therefore aviation becomes literally the pivot of world policy—economic and military. Our foreign relations and the troubled political state abroad, demand observance of War and Navy warnings. Our domestic transportation needs call for the utilization of aircraft. It is possible for us to perform the latter service so that the former will be met and the nation at once benefited and protected.

Useful Service Recognized

In the First National Air Institute, which the Aeronautical Chamber of Commerce held at Detroit in collaboration with the National Advisory Committee for Aeronautics, the American Society of Mechanical Engineers, Society of Automotive Engineers and the Detroit Aviation Society, the useful services of aircraft in business were recognized by bankers, lawyers, merchants and manufacturers.

Subsequent to the Air Institute, and growing out of the nation-wide demand for correction of faults in our transportation system by co-ordinating all facilities, the National Transportation Institute, recognizing rail, water, highway and air, was formed at meetings in New York and Chicago. Shortly after the first of the year, at the annual meeting of the United States Chamber of Commerce in New York, designed to bring railway, highway and waterway together upon a mutually helpful basis which would satisfy the public and meet political criticism, the airway was recognized by resolution.

Students of our transportation problem have followed similar lines of reasoning. In one of his addresses, Dr. T. W. Van Metre, Professor of Transportation at Columbia University, said:

> "When the steam locomotive was introduced, and for several years thereafter, there were many individuals who clung tenaciously to the belief that steam railroad transportation could never prove a superiority over the stage-coach and the canal boat as the leading instrumentality for long-distance carriage of passengers and freight. But the steam railway business continued to grow. Had people had a little more vision and imagination, and had there been less blind prejudice against the steam railroad, much of the loss which the process of readjustment involved could have been avoided. It will be wise to endeavor to estimate what effect the development of aircraft service will have upon other transportation enterprises, and to try to provide for readjustments which the new service will make necessary."

Aircraft and the Railroads

As a matter of fact, the railroads, having for two generations pursued the mistaken policy of endeavoring to exterminate water competition, are beginning by reason of traffic requiring other channels, to recognize that waterways are useful. Since the war the perplexing problem of Government control and public owner-

ship have been further complicated by competition from the motor truck. Into such a situation it would seem hazardous for commercial aircraft to intrude, but the contrary is true. Those railway executives having concern especially for the all-important factor of public relations are now seriously regarding the airplane and the airship as a means of relieving them of excess-speed traffic, which is proving costly and burdensome, thereby contributing to the avoidance of congestion and freeing the right of way for the movement of more profitable goods. Time, of course, is an element in all transportation. In Railway Age for November 25, 1922, there appeared the following, attributed to an official of the American Railway Association:

"It is a fact that there are approximately 30,596,000 tons of freight constantly in transit, valued at approximately $1,503,000,000. If the average time in loading a car or unloading it or if its transportation can be reduced only one day, it will save an annual interest charge against the goods in transit of $18,042,000."

Co-ordination Offers Opportunity to Aircraft

Among the railway officials who have investigated commercial air transport probably the best known is A. H. Smith, President of the New York Central Lines, who, at the request of the Editors of this volume, expressed his views as follows:

"Adequate transportation is vital to the country's prosperity, and I believe the public is now coming to a realization that the railroads must be permitted to expand in pace with the growth of population and commerce. The demand for greater efficiency must be supported by the means to achieve it.

"In all forms of transportation, that which offered the greatest speed has always attracted patronage. Looking backward over less than a century of steam railway operation one finds that the railways superseded the canal boat and stage-coach because of increased speed, long distance hauls, safety and economy upon a steadily improving scale, as knowledge of engineering and experience in operation developed. Through the liberality of Federal and State expenditures, there has been a resumption of water-borne and highway traffic, due, in the first instance, to lower cost, in some cases, and to the sheer volume of business in others; and, in the second instance, to the motor car and motor truck, which have displaced the horse, as well as the railroad, for short-distance hauls of people and goods. There has been an astounding expansion of motor traffic.

"It would seem from the expenditure since the Civil War of well over a billion dollars for waterways and harbors and since the passage of the Federal Highway Act of 1917 of approximately 674,000,000, for good roads that Government subsidy has been available, in a large measure, for some forms of transportation.

"We need in the United States a definite, clear transportation policy. The railways were sometimes assisted in the early days, but for the last twenty years, and to an alarmingly increasing degree within the last ten

years, legislation and regulation have so adversely affected the railways that their problems seriously menace the power to anticipate and promote the growth in business. And along with this attitude toward the railways, there seems a trend to foster, at the expense of the public treasury, routes which are essentially competitive to the railways, both waterways and highway systems, but permitting each, at the same time, to remain free from the restrictions and regulations imposed upon the railroads.

"Now there appears a new means bidding for public patronage, and, to a degree, public appropriations. I have never flown in an airplane, but I expect to. In traveling on the Twentieth Century Limited, which the New York Central believes is the finest train in the world, and observing from the window a seaplane flying up the Hudson at a speed at least half again as fast as the Century, or a mail plane bound overland for Chicago making two miles and a half to the Century's one, I cannot close my mind, as did the stage-coach owners in the late thirties, to the fact that here is a new form of transportation which, sooner or later, may become of substantial service for other than war purposes.

"The traveling and shipping public require, in varying ratio, according to changing needs, speed, safety, comfort and economy. It seems desirable to study aerial transport possibilities further from the standpoint of its available speed and saving of time. The airplane is the fastest machine ever devised; but it is, perhaps, neither the safest, the most comfortable nor the most economical. That it will become safe and efficient, I am sure, as progress is inherent in the practice of engineering science. But aircraft have to offer speed—speed over long distances in airships, and even greater speed in airplanes over comparatively short distances. It has been shown that, as the speed of a railway train is increased, so does its cost of operation increase. The speeds of railway trains in this country are equal to any in the world. The traveling and shipping public, however, would no doubt appreciate more speed at less cost if safety and convenience are not to be sacrificed in the effort.

"Aerial transport, just as highway and waterway transport, may become a useful auxiliary—aircraft providing tremendous speeds for passengers or goods that must save time at all hazards; motor cars and motor trucks providing service for goods or people over short routes; and waterways offering in the open season a natural means which may be employed for the moving of bulk freight, in the transportation of which time is a negligible factor.

"To my mind, aircraft were introduced to the world with a serious handicap. While they were invented by Americans, their intensive and extraordinary development was as a weapon in a war which America did not start. This was, perhaps, inevitable, because such craft are capable of utilization for either constructive or destructive purposes. I believe that aviation will never command the generous support and patronage of the traveling and shipping public until the public has had demonstrated to it that the airplane and airship are not primarily engines of war—any more than chemical science or electrical energy—but that they may become beneficent servants of man, enabling him to attain a higher and more prosperous state of civilization.

"How will commercial aircraft be regarded by the railways? My judgment is that when the railways find that aircraft offer an expeditious high-speed service which can be used to relieve the railways of certain portions of traffic requiring excessive or abnormal speed, then there must naturally develop a mutually advantageous co-ordination. How long this will require depends upon the demonstration of utility by aircraft.

"In this connection, it seems proper to urge that our greatest immediate need in transportation is not 'unification,' but support. The expanding population of this country is responsible for the increasing demands upon our transportation facilities. There is ample opportunity in their respective classes of service for railway, waterway, highway and airway."

Stimulate Public Interest and Support

The services which commercial aircraft offer are recognized, and already in a modest way are being demonstrated. The right foundation—the correct conception of air transport—has been laid, and sound growth is inevitable. But this will require time, as it is not in human power to achieve at once the ultimate in the air any more than it was to create in its perfection, the modern railway train or steamer. All that Europe has done to encourage aviation we do not desire to do. Large military appropriations and the subsidizing of commercial activities to military ends can never meet with favor in America and, if undertaken, would defeat their own ends. But wisdom in expenditures to conserve the aircraft industry, the removal of unnecessary burdens in competition within the industry and between the industry and the Government are obvious improvements. The art must be given a legal status; the Air Mail should be extended and, as fast as practicable, taken over by private operators; and, through some agency such as the proposed Bureau of Civil Aeronautics in the Department of Commerce, everything possible should be done to stimulate public interest and support, as urged by President Harding.

THE WHITE HOUSE
WASHINGTON

June 23, 1922.

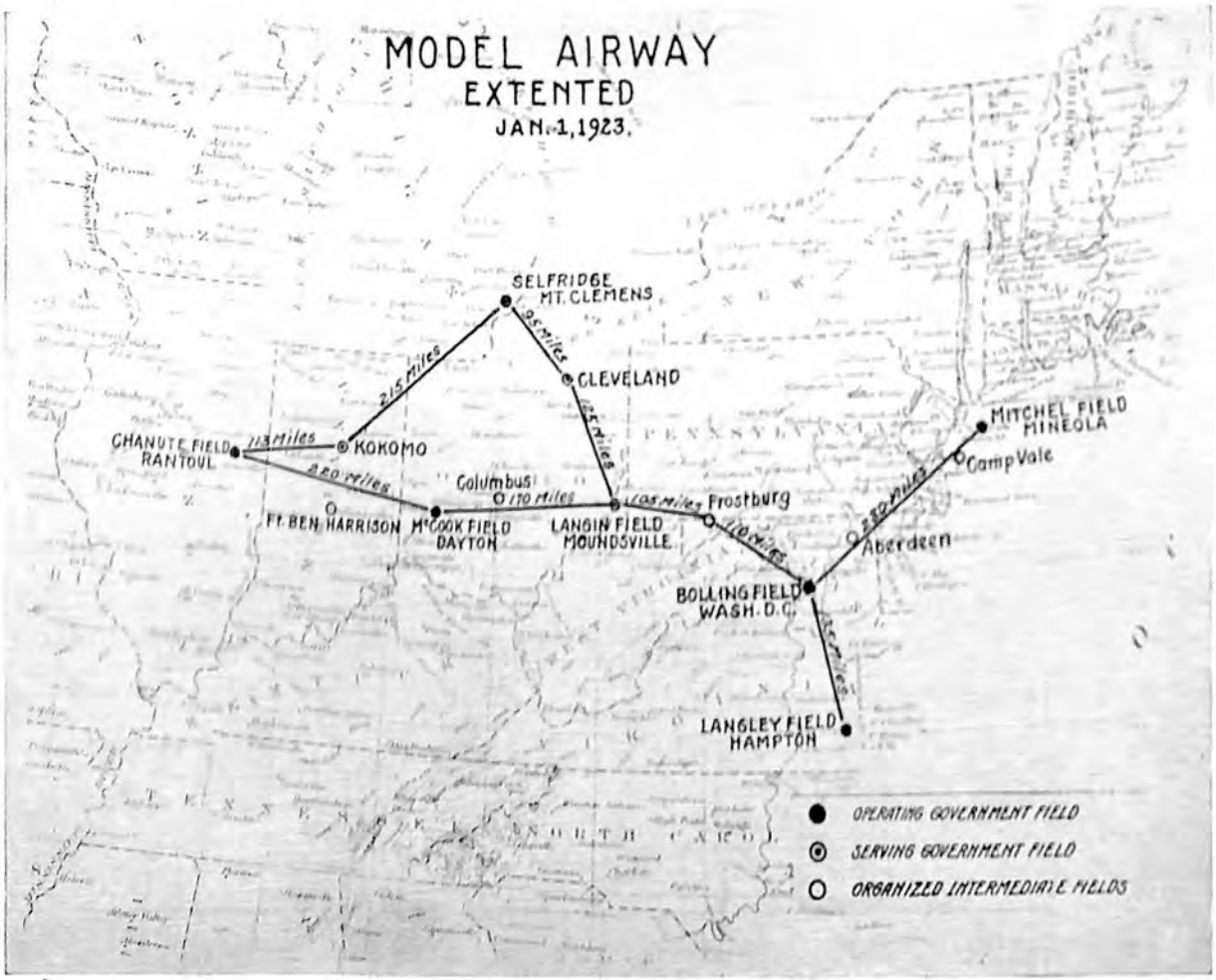
Gentlemen:

I find pleasure in adding a word expressive of my interest in aerial transport, and in the presentation of the subject which is being made by the Aeronautical Chamber of Commerce. The history of civilization is largely the history of communication. Each stage of progress seems to demand and develop improved means of transport. The steamship, the railroad and the motor car have been devised and utilized. Now we enter a new phase. It is a real distinction to America, to be known as the birthplace of the airplane; it should be our concern that this art shall not languish, but that in its practical application we shall lead the world. The amazing development will take place in the near future in the utilization of the air as a medium of transport and communication. As a government, we are aiming to provide this art with necessary guaranties of law, and with such facilities as may be possible through the encouragement of airways and terminals. But for air transport quickly to achieve the important place it is destined to occupy, it must have public interest and support. I hope your efforts in this behalf may be productive of most gratifying results.

Very truly yours,

Warren G. Harding

Aeronautical Chamber of Commerce of America, Inc.,
501 Fifth Avenue,
New York City, N. Y.


MODEL AIRWAY
EXTENTED
JAN. 1, 1923.
SELFRIDGE
MT. CLEMENS
215 Miles
95 Miles
CLEVELAND
185 Miles
CHANUTE FIELD
RANTOUL
113 Miles
KOKOMO
260 Miles
Columbus
170 Miles
105 Miles
Frostburg
110 Miles
250 Miles
MITCHEL FIELD
MINEOLA
Camp Vale
Aberdeen
Ft. BEN. HARRISON
McCOOK FIELD
DAYTON
LANGIN FIELD
MOUNDSVILLE
BOLLING FIELD
WASH. D.C.
185 Miles
LANGLEY FIELD
HAMPTON
PENNSYLVANIA
SOUTH CAROLINA
OPERATING GOVERNMENT FIELD
SERVING GOVERNMENT FIELD
ORGANIZED INTERMEDIATE FIELDS

Miss Katherine Wright, sister of Wilbur and Orville Wright, christening the *"Wilbur Wright"* flying boat of the Wright Aeronautical Corp. Orville Wright is seen directly behind his sister.

CHAPTER II

COMMERCIAL AIRCRAFT IN THE UNITED STATES; CRITICAL STUDY OF SERVICES PERFORMED AND PROBLEMS OVERCOME

TO express the opinion that American leadership in the air is more remote than it was a year ago, and yet to assert that, in commercial aviation, we are steadily gaining confidence and demonstrating increased usefulness, is to present an apparently contradictory but really truthful picture.

The Aeronautical Chamber of Commerce estimates that approximately 1,200 commercial aircraft were in operation in the United States during 1922. This is the same figure given for 1921, losses and depreciation being compensated for in new construction and in the release by the Government of additional surplus equipment.

As in 1921, it is estimated that about one-half, or 550 to 600 of all the commercial aircraft, are in the hands of itinerant fliers, or gypsies, whose movements are very difficult to trace, and 600 to 650, according to reports voluntarily submitted, are under the control of the fixed-base operators, or those who have the responsibility assumed with financial or business obligations.

A careful analysis of available records, together with observation and correspondence, justifies the belief that, while in 1922 there was if anything a decrease in civilian flying, as compared with 1921, commercial aviation as a whole was upon a much sounder basis. Free demonstration flying, merely for publicity purposes, is no longer regarded as necessary. Stunt flying with passengers has diminished in favor of paid flying without passengers and under stricter safeguards. In many instances even this type of demonstration is being abandoned for "taxi work," or long-distance, cross-country flights with passengers or cargoes of merchandise. This "taxi-flying," in turn, is the natural introduction to air transport, on schedule, which is the aim of commercial aviation.

First Practical Steps Taken

Having taken the first practical steps toward providing services for which the public will pay, the fixed-base operators are so improving their manner of operation that they are learning what it costs to do business. They are getting longer and more continuous

use from their equipment. They have learned that curiosity is fickle but that a permanent market is found for their activities in meeting the every-day demands of commerce and industry. Consequently, as compared with 1921, they have reduced their charges for short flights over 22 per cent; their charge per mile for inter-city passenger transportation over 21 per cent, and their charge per pound per mile for merchandise about 87 per cent.

Here are the comparative recapitulations, among transient and permanent operators, for 1921 and 1922:

Transient

	1921	1922
Estimated number of aircraft	600	550-600
Estimated mileage flown	3,000,000	3,000,000 (or less)

Permanent

	1921	1922
Operators reporting	125	129
Terminals:		
Land	116	107
Seaplane	30	26
Public included in totals	16	10
Total terminals	146	133
Equipment in operation:		
Land		450-500
Seaplane		80-100
Amphibian		1
Balloons		4
Estimated total equipment	600	650
Number of flights	130,736	89,936 (110 operators reporting)*
Average duration of flights	21 min.	26-30 min.
Total mileage flown	2,907,245	2,846,037 (119 operators reporting)*
Passengers carried	122,512	75,268 (110 operators reporting)*
Pounds of freight carried	123,221	110,663 (21 operators reporting)*
Average charge per short flight	$9.00	$7.00 (91 operators reporting)*
Charge per pound of freight per mile	.33	.036 (10 operators reporting)*
Charge per mile, inter-city flight	.55	.428 (58 operators reporting)*

Transient and Permanent

	1921	1922
Estimated total number of aircraft	1200	1200
Estimated total mileage	5,907,245	5,846,037

* Note that these figures do not cover all operations, but are limited to actual replies from the log books of those operators maintaining complete records.

These 1200 commercial aircraft were to be found in all parts of the United States, the transients most frequently at those resorts where the curious or those seeking thrills were most likely to be found. The gypsies, of course, moved north or south, inland or seaward, according to the change of season. Permanent operators, if moving at all, did so because they at first had used poor judgment and had found more tangible inducements elsewhere. This undoubtedly accounts for a rather curious readjustment of distribution shown by the fixed-base table, and leads to the further deduction that it is not every community which, in the present state of the art, at least offers encouragement to the aircraft operator.

It will be seen from the following that in 1922, as compared with 1921, sixteen states showed a decrease in the number of fixed-base fliers, fifteen showed an increase, while seven remained stationary:

State	*1921*	*1922*	*Increase or Decrease*
Alaska	0	1	−1
California	10	11	+1
Colorado	1	1	
Connecticut	1	0	−1
Florida	3	4	+1
Idaho	1	0	−1
Illinois	8	12	+4
Indiana	1	1	
Iowa	4	3	−1
Kansas	6	10	+4
Kentucky	1	0	−1
Louisiana	1	0	−1
Maine	1	3	+2
Maryland	0	1	+1
Massachusetts	3	2	−1
Michigan	0	5	+5
Minnesota	2	2	
Missouri	6	9	+3
Montana	2	4	+2
Nebraska	3	1	−2
Nevada	1	1	
New Hampshire	1	2	+1
New Jersey	5	4	−1
New York	15	17	+2
North Dakota	1	1	
Ohio	6	4	−2
Oklahoma	5	3	−2
Oregon	1	0	−1
Pennsylvania	4	5	+1
South Carolina	1	0	−1
South Dakota	5	5	

State	1921	1922	Increase or Decrease
Texas	12	4	+8
Vermont	1	1	
Virginia	2	0	−2
Washington	6	7	+1
West Virginia	1	0	−1
Wisconsin	3	2	−1
Wyoming	0	1	+1
Canada	0	2	+2

States operating in 1921—34
States operating in 1922—30
States showing decrease—16
States showing increase—15
States stationary—7

Retarding Influences

Before attempting detailed analysis of the constructive features of the record in 1922, mention must be made of the retarding or destructive influences against which the fixed-base operators had to contend. These were chiefly lack of Federal air law and lack of systematized air routes and terminals. As will be shown, particularly in the experiences of Aeromarine Airways and the various Curtiss distributors and operators, the responsible fliers had to bear not only their own burdens but also those imposed by the shortcomings of the irresponsible pilots. And while there was a widespread and commendable public interest in the establishment of public air terminals these were disconnected or so situated, commercially and industrially, that they could not be fully utilized for such air transportation as available business required.

This deficiency has continued, despite nation-wide demands for correction, for over four years and a disturbing indication of what it may eventually result in is found in a brief review of 1920 and 1921.

In the Aircraft Year Book for 1921, 88 operators reported; in the Year Book for 1922, 125 and in this volume, 129. Of the 88 listed in 1921, 24 reported in 1922 and but 17 again in this edition. Of the 125 listed in 1922, 56 are to be found again in the issue of 1923. This means that, of the 129 operators voluntarily submitting reports in 1923, only 17 have been in business three consecutive years and 56 two years, while 56 others appear as new activities, fresh with enthusiasm and firm in their belief that they can succeed where their predecessors failed.

Aeromarine Airport, Cleveland, O. *Below*—Aeromarine Cruiser "*Buckeye*" at Pulitzer Races. Beginning second from right, Col. J. Mayhew Wainwright, Assistant Secretary of War; Edwin Denby, Secretary of Navy, and C. F. Redden, President Aeromarine Airways.—Official Photo, U. S. Navy.

Christening of Aeromarine Cruiser *"Cordeaux"* at Nassau, B. W. I.
Below—Arrival of Aeromarine Cruiser at San Juan, Porto Rico.

The fact that so many flying enterprises appear short-lived is believed to be due, more than anything else, to the lack of Federal air law, providing both regulation and stimulation. Thus it has frequently happened that, in attempting to do that which in large part should be provided for them under a Federal code, the pioneers in air transport have been unable to persuade capital to remain in the business. Capital instinctively retreats from risks which men engaged in pioneering enterprises must incur, and in aviation no exception is noted. Capital can only be interested and held through tremendous profits, thus justifying risks, or through conservative returns with complete legal status and protection, in which aviation at present is wholly lacking.

To have remained in commercial flying for two or three years may be regarded as fair evidence, therefore, that these operators offer services of which commerce and industry are really in need. The saving of time being a saleable service, the transportation of passengers and merchandise, in the movement of which time is a factor, is obviously a most important commercial function, though not at present the most profitable. Next in significance, and of more satisfactory immediate return, are aerial photography, mapping, surveying, etc. In the third class may be placed special services, of which timber cruising or forest patrol and aerial advertising are the most interesting.

Aeromarine Airways—Three Years of Commercial Operation

Among the 129 operators whose activities were reported to the Chamber, Aeromarine Airways, Inc., maintaining air services in 1922 between the Florida coast and the West Indies; New York, Atlantic City and other Atlantic coast ports; and on Lake Erie, between Cleveland and Detroit, occupies a unique position. The experiences of this company, since it sent up its first commercial boat in 1920, are probably without parallel, inasmuch as they are the result of a private, pioneer effort in a new field of transportation, independent of Government subsidy, and, at the start, lacking even public interest or support.

Of the seventeen aircraft operators reporting for three consecutive years, Aeromarine alone shows a consistent record of growth:

Points between which air transport was maintained	*1920*	*1921*	*1922*
	Key West-Havana	Key West-Havana; New York-Atlantic City-Southhampton-Newport	Key West-Havana; Miami-Palm Beach-Bimini-Nassau; New York-Atlantic City-Southampton-Newport; Cleveland-Detroit
Length of lines.....	100 miles	441½ miles	866½ miles
Number of aircraft..	3 11-passenger flying boats	5 11-passenger flying boats	7 11-passenger and 9 4-passenger flying boats
Number of miles....	14,200	95,020	739,047 (passenger miles)
Number of passengers	1,100	6,914	9,107

This extraordinary growth, first in the face of a general post-war lapse in public interest in aeronautics, and more recently despite the almost insurmountable cost of carrying on supplementary activities, necessary to successful operation, yet which constituted a Government obligation on behalf of all commercial aviation, is explained primarily by the manner in which the Aeromarine company approached the experiment.

The initial route—Key West–Havana—was selected because it offered aircraft an excellent opportunity to capitalize their greatest asset—speed—in competition with slower means of transportation; because it united with the continent the most important island in the West Indies and there was thus available well-balanced business and pleasure traffic; and because, lying entirely over the water, it embraced obvious elements of safety. These factors also, rather than transient curiosity, which had been the reason hitherto for much so-called "commercial" flying, guided the Aeromarine company in the extension of its lines elsewhere.

Presented in terms of time and fare, in contrast with rail and water transportation, Aeromarine operations in 1922 were as follows:

		Key West-Havana	*Miami-Palm Beach*	*Miami-Bimini*	*Miami-Nassau*	*N. Y.-Atlantic City*	*N. Y.-S'h'mpton*	*Cleveland-Detroit*
Distance	r	.....	69 mi.	.....	.....	143 mi.	94 mi.	150 mi.
	w	100 mi.	75 mi.	45 mi.	192 mi.	100 mi.	110 mi.	130 mi.
	a	100 mi.	69 mi.	45 mi.	187 mi.	93 mi.	100 mi.	117 mi.
Time	r	.....	170 min.	.....	.....	195 min.	183 min.	6 hrs.
	w	8 hrs.	.....	4½ hrs.	18 hrs.	.....	.....	10 hrs.
	a	75 min.	60 min.	40 min.	150 min.	75 min.	70 min.	90 min.
Fare (one way, per pass.)	*r	.....	$2.39	.....	.....	$4.93	$3.28	$4.25
	w	$20 aprx.	.....	.....	$24.00	.....	.....	8.00
	†a	50.00	30.00	25.00	75.00	45.00	50.00	40.00

* Rail fares are given without parlor or Pullman car charges. If added these would increase fare rates about 50%.

† Air fare lowered according to volume of traffic.

The first season, $75.00 was fixed as the one-way fare for the Key West-Havana flight. The next season it was lowered to $50.00 and it has been kept at that figure. Observation of the mental and physical reaction to flying led to the conclusion that it would be a mistake further to reduce the price during the constructive stages when heavy investments and expenses were necessary. This decision, as contrasted with the efforts of subsidized European air lines to lower air tariffs to the level of rail or water figures, was based upon the conviction that, granting a reasonable charge by aircraft, provided they were assured the services of a trained, trustworthy organization of proved reliability, those who really *wanted* to fly would fly; whereas, those who *did not want* to fly would not pay a nickel. The practical results achieved by Aeromarine invite the belief that this theory is correct, at least until the base and flying organizations are established and the formative period has been passed. The air fare between Cleveland and Detroit is $40.00. Of the 4,388 passengers carried on this route in 1922, 70% represented business men who wanted to save time because it meant money to them and who consequently were ready to pay for such saving.

The types of people transported on the various divisions of Aeromarine are a cross section of ordinary traffic. Most of the purchasers of air tickets on all lines are business travelers. A large percentage, particularly during holiday periods, go for pleasure. A decreasing percentage fly merely out of curiosity. None fly via Aeromarine for thrill, for the requirements of safety eliminate all elements of danger. Of those who fly for commercial reasons, men, of course, are in the majority, though in the West Indies operations in 1922, out of a total of 2399 persons carried, 55% were women and children.

Safety involved four factors: First, route over the water, which was already provided; second, equipment; third, personnel; fourth, base organization and communications. Aeromarine selected the F.-5-L and H.S.-2-L types of flying boat because they had been tested by the Navy in heavy sea duty. The company's first personnel was likewise recruited from the Navy. Base organization and communications were non-existent and had to be evolved through demonstration.

It was one thing to use a plane for short, intensive periods of military work and quite another to operate it at regular intervals, day in and day out. It was one thing for a pilot to "take a chance" in service in order to reach his objective; it was quite another for him to fly with the thought *never take a chance* uppermost in his mind. Thus from the outset it was necessary for Aeromarine to

adapt craft and train pilots and crew. It was the desire in 1920 to operate F.-5-Ls only until the satisfactory type of commercial boat could be evolved. But desire and achievement in an art constantly developing under perpetually changing conditions were very far apart. Operations could not be suspended for the "ultimate" craft; adaptation and progressive improvement alone were possible. Thus, out of this practical laboratory, Aeromarine mastered problems of operation through redesigning and strengthening the hull, improving methods of control and devising new means of construction and bracing for anchoring; overcame mildew by means of ventilators; developed a new thick wing section which greatly increased efficiency and improved the Liberty motor through redesigning and improvement of parts. Late in 1922 Aeromarine was constructing at its Keyport, N. J., plant a specially designed and fabricated type of commercial flying boat, with metal hull, the direct result of three years of practical operating experience.

Discipline in military or naval service means devotion to duty at all costs; discipline in commercial aviation means, first of all, safety for passengers, conservation of equipment and economy of operation. Usually, during the war, F.-5-Ls went aloft with a load of bombs and a crew of five or more. Aeromarine cruisers travel with eleven passengers and but three crew—pilot (who is also navigator), mechanic (who is also relief pilot), and bow man.

The ground organization of Aeromarine was extensive and costly as many experiments had to precede one success, and in instance after instance, for service and facilities which are regarded in Europe as an obligation on the part of the Government to provide for reasons of public policy, Aeromarine alone bore the burden. Terminals at New York, Miami, Palm Beach, Key West, Havana, Bimini, Nassau, Atlantic City, Southampton, Cleveland and Detroit represented an investment which raised the overhead to a disproportionate figure.

In the matter of radio communications, which abroad are being developed by the various Governments, Aeromarine carried on protracted and expensive experiments, so that it enters 1923 with a radio telephone of its own development and believed to be the most successful for air navigation yet demonstrated. Weighing but 150 pounds, energized by batteries, protected from shock by springs resting upon springs, it enables a flying boat to carry on clear conversation for 200 miles. Aircraft radio has hitherto been undependable in times most needed—forced landings in heavy seas; the Aeromarine radio functions whether the craft is in flight or at rest.

It is the assertion of Aeromarine officials that in the four essentials of practical aviation their line leads the world; First, safety;

second, knowledge of costs; third, regularity of service; fourth, comfort and convenience of passengers.

The safety record of Aeromarine up to December 31, 1922, is believed to be without parallel in aviation anywhere. To have flown over one million miles, transporting 17,121 passengers, without a single serious mishap, is an achievement, which, considering the newness of the art and the comparative inexperience in air transport, is truly remarkable.

Bankers, on approaching commercial aviation as an investment field, first ask, "Is it safe?" and then "Do you know what your costs are?" The cost sheets of Aeromarine cannot be made public as they represent an important asset, but it can be stated definitely that, for every $100 spent, well over half, or about 69 per cent went for insurance, depreciation and sales; 15 per cent for fuel, operating labor and overhead; and 16 per cent for maintenance and inspection. Of the 69 per cent credited to insurance, sales and depreciation, about 25 per cent went for insurance. Insurance is almost prohibitive because of the lack of Federal law. The underwriters, suffering heavy losses from crashes by irresponsible fliers, pass the burden on by increasing the premiums from the responsible operators. The task of interesting the public in aviation, which should be a national duty, imposes a severe burden, for Aeromarine, in order to sell one flight ticket, generally has to convert the purchaser to patriotism, national security and local pride.

Due to unceasing vigilance, represented by daily inspection, overhaul at frequent stated periods, and seasonal rebuilding or restoration, the ultimate cost of depreciation has been relatively low. Of the three F.-5-Ls launched in 1920, two are still in service, one, the *"Santa Maria,"* having a record of 600 hours, or approximately 48,000 miles. Of the five boats operated in 1921 and the sixteen in 1922, all enter the service again in 1923. Before and after each trip, the boats are flight-tested, inspected, adjusted and repaired, if necessary. At frequent established periods, they are hauled out of the water—just as a surface ship is placed in dry dock—for thorough examination of the hull.

The engines are daily gone over and the instruments scrutinized. Samples of oil after each trip betray the presence of dirt or metal. If metal is detected—a sign of abrasion—it is regarded as a danger signal and the boat either taken out of service, or a fit engine installed. At the end of every 100 hours, or approximately 7,500 miles, engines are completely torn down and reassembled and all worn parts replaced.

Fuel costs are not great. Operating labor, held strictly to depend-

ability, is well recompensed. Aeromarine has in effect a composite merit and bonus system, which enables the high grade pilot to draw as high as $90 weekly pay, mechanic around $55 and bow man, $40.

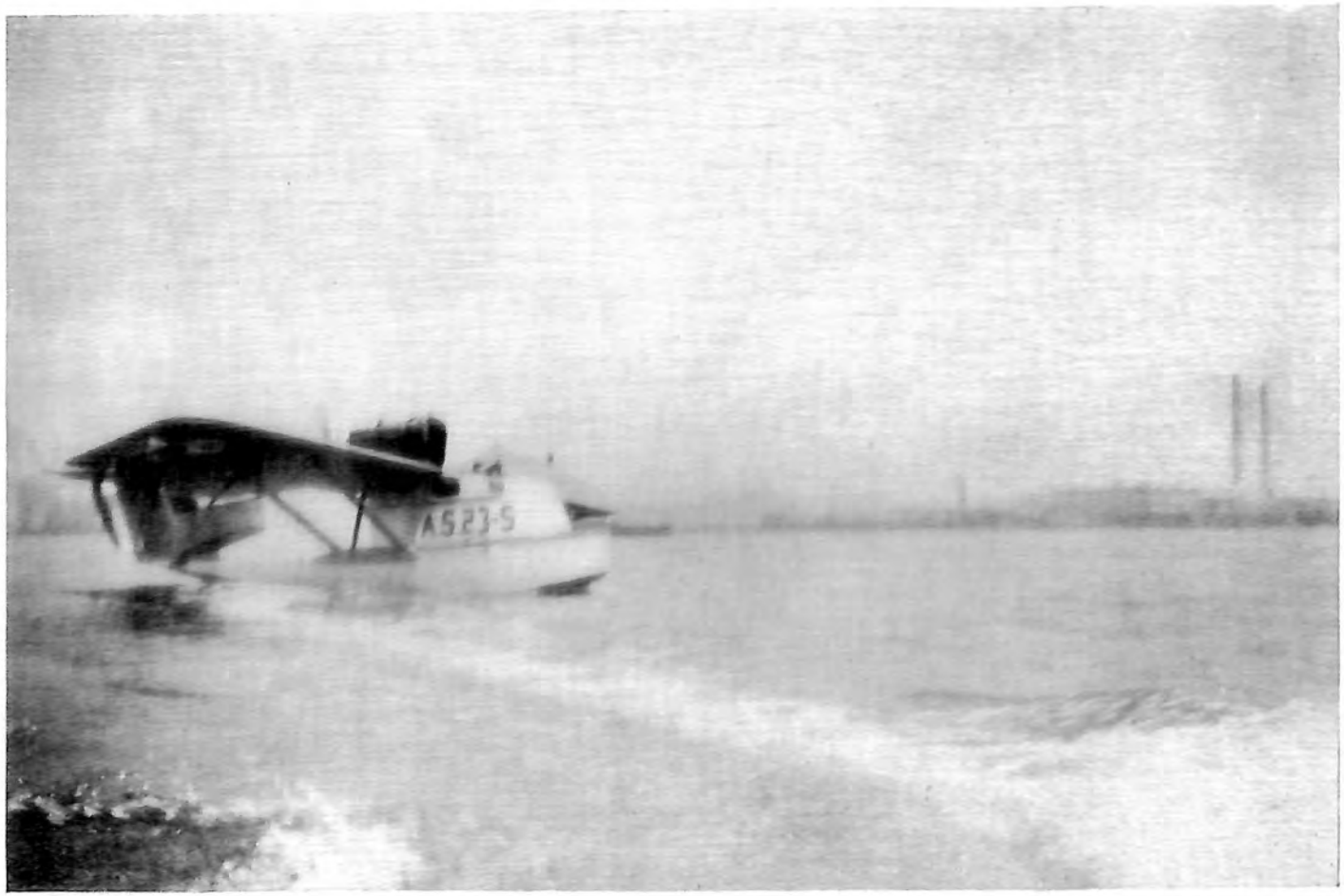
As an illustration of the reliability to which air transportation can attain, the performance of the Great Lakes Division may be cited. Of 222 flights scheduled, 222 were actually completed. On the Southern Division, flights are subject to cancellation whenever, in the judgment of the base commander, weather conditions on the Gulf of Mexico raise the question of safety.

For the comfort and convenience of passengers, Aeromarine provides personal porter and agent service from train or steamer to hotel, this service being a part of the air voyage for which the ticket is sold. The flying boats are steady, flight is maintained on an even keel, landings are gentle, the seats are soft and commodious, and there is ample leg room and ample ventilation. Good vision is obtainable through glazed ports. There are lavatory accommodations, correspondence and postal facilities and, of course, the wireless telephone.

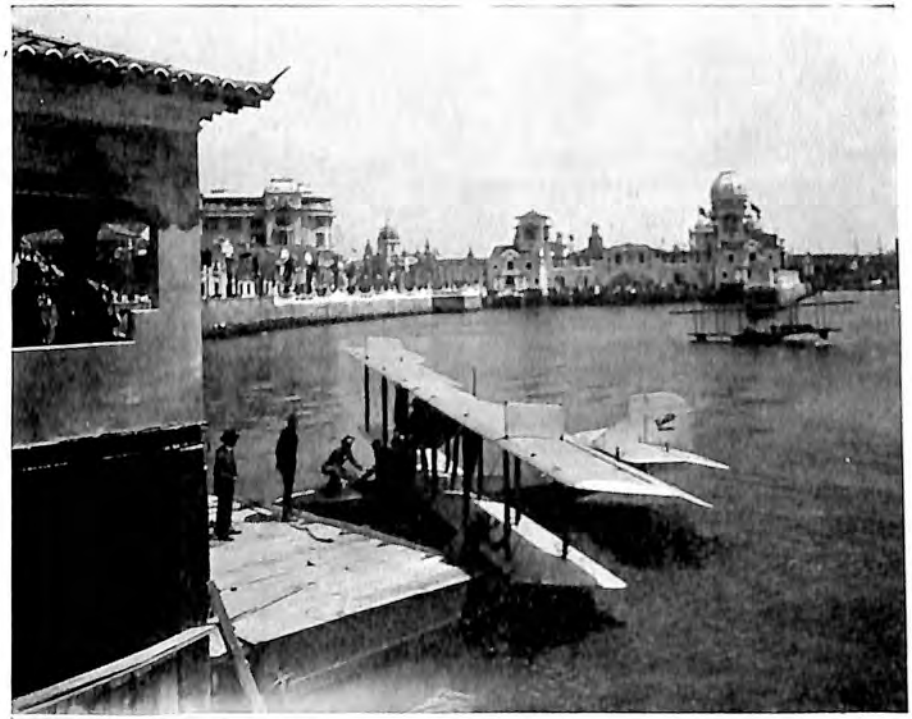
Inglis M. Uppercu is chairman of the board of Aeromarine Airways, Inc. The development of the organization and its general management is under the personal direction of Charles F. Redden, President. The position of Aeromarine at the close of 1922 and its attitude as to the future of commercial aviation is summarized by Mr. Redden thus: "After three years of successful operation, we have demonstrated, we believe, that properly regulated flying has been made safe. We now feel confident that the time is not far distant when air travel will be accepted by the general public as a desirable and necessary means of transportation."

Mail-Freight Service in Northwest

Comparing the return made by Aeromarine with the total, it is seen that Aeromarine during 1922 carried over 12 per cent of all passengers reported to the Chamber as having been transported by fixed-base operators. A position with regard to freight comparable to that held by Aeromarine in passengers is achieved by Edward Hubbard, whose flying boat line between Seattle and Victoria, B. C., is operated primarily for the carrying of mail between transcontinental train service terminating at Seattle and trans-Pacific steamship service, terminating at Vancouver. During the period covered by his report, Mr. Hubbard transported thirty tons, or 60,000 pounds of mail, saving as much as a fortnight or two weeks, according to the time of sailing. As 110,663 pounds of freight were reported as having been carried by all the other operators reporting on this



Loening Air Yacht *"Grey Lark,"* New York-Newport Line, taking off from East River, New York.



Curtiss Flying Station in Exposition Grounds, Rio de Janeiro, Brazil. *Below*—Curtiss flying boat of Northbird Aviation Co., at Juneau, Alaska.

phase of their activity (21), it is seen that Mr. Hubbard's share was over 54 per cent. Mr. Hubbard's activities are more fully discussed in the Air Mail Chapter (No. V).

New York-Newport Air Service, Inc.

In the Aircraft Year Book for 1922, the tendency of demand for air transport was noted either in populous communities where the facilities for surface transport were inadequate, or in undeveloped regions lacking ordinary communications. This theory would seem to be justified in the announcement, late in 1922, of the New York-Newport Air Service, Inc., operating Loening Air Yachts between the cities indicated; and the establishment, about the same time, of taxi express between San Francisco and Modesto and other points in the San Joaquin valley of California by Walter T. Varney, and of a similar activity in the mountains of southeastern Kentucky by John P. Wood.

Grover C. Loening, president of the Loening Aeronautical Engineering Corporation, has associated with him in the New York-Newport enterprise, individuals whose names are nationally known in finance and society, such as: Robert Goelet, Arthur Curtiss James, James B. Duke, Henry Walters, Oliver Gould Jennings, Henry A. C. Taylor, Stewart Duncan, H. Barton Jacobs, Marion Eppley, George Henry Warren, Forsythe Wickes, Ogden Hammond, Clarence Dolan, James S. Cushman, Mrs. Vanderbilt, Mrs. Nathaniel Thayer, Mrs. O. H. P. Belmont, Mrs. Horace Gallatin, Mrs. James B. Haggin, Mrs. Charles F. Hoffman, Mrs. Hugh Auchincloss, Mrs. Frederick Pearson, Grafton Cushing, John Aspegren, J. F. A. Clark, Francis Roche, George Widener, I. Townsend Burden, Lawrence I. Gillespie, Clarence Pell, Oscar Cooper, Edson Bradley, William Fannestock, Conde Nast, Paul Fosdick, Bradford Norman, R. G. Shaw, T. Suffern Tailer and Vincent Astor.

"Transportation at 120 miles an hour," is Mr. Loening's assurance, many times demonstrated in the past by Vincent Astor, Harold Vanderbilt and other pilot-owners of Loening Air Yachts. While Mr. Loening's associates are interested in aviation, just as other citizens are, they are more interested in "transportation at 120 miles an hour" as a practical undertaking. The feature of the New York-Newport service, to the general public, of course, is its appeal to the wealthy and exclusive patrons of the Rhode Island resort. The underwriters, whose subsidy made the service possible, feel that the effort, through practical demonstration, will aid materially in the acceptance by the general public of commercial air transport. This subsidy has also made it possible to charge a special rate of fare of

$30 each way, with ordinary luggage and golf bags carried free. The distance between New York and Newport by rail and surface boat is about 175 miles, and the ordinary time required for the trip is seven hours. By air, up Long Island Sound, the distance is 143 miles and the flying time one hour and a half. The rail and surface boat fare, first class, is $15. The Air Yacht fare is but twice this amount, yet the time by air is only about one-fifth that required by rail and surface boat. Terminals have been established in New York at 31st street and the East River, and at an equally accessible point on the shores of Newport harbor. Bi-weekly round-trip flights were scheduled during June, July, August and September. The Air Yachts *"Fleet Wing," "Grey Lark"* and *"Sea Bird"* were in commission.

Mountaineers, Moonshiners and Millionaires

Quite the reverse in location, type of service, and patronage, is the air transport established late in 1922 by John P. Wood. Wood is a war-trained pilot who, starting with practically nothing, has steadfastly resisted the profitable but untrustworthy returns of circus flying. In 1922 his two Curtiss-Standards flew some 30,000 miles, carrying 2,750 passengers. Late in the summer he chanced to visit the little town of Louisa, Kentucky. The railroad which serves Louisa is the only one through a considerable region, formerly rugged and noted more for its moonshining than for industry or agriculture. With exploitation by oil and timber corporations, however, the situation has changed. There are only dirt roads, and these are impassable most of the time. Big business men leave the train at Louisa and from there take an automobile taxi or horse for hard and prolonged journeys of twenty or thirty miles. Frequently a day or a day and a half is required. Wood was quick to see the opportunity. He flew his ships to Louisa and established a terminal. Within a short time he was regularly operating between Louisa, Blaine, Martha, Skaggs and Paintsville, Kentucky, and Huntington and Williamson, West Virginia. With fares but little higher than those charged by motor taxis, and covering 20 miles in 20 minutes, he believes he can so establish himself that the public will require his services, even if railroad spurs and better highways are built. He believes this as the character of his patrons is inclusive, ranging from New York millionaires to natives; oil and timber executives and laborers; commercial travelers, and, on several occasions, entire families. He also enjoys an increasing traffic in freight and supplies urgently needed at the exploitation camps.

Cross-Country Service by Curtiss Operators

Of all forms of transportation, travel by air alone unites the possible features of regularly operated lines, held to a definite route combined with extraordinary service feeding the main channel or branching off from it. For this reason, the remarkable expansion of cross-country or "taxi-service" flying is of especial interest.

Of all the operators reporting, the seven organizations connected by corporate name with the Curtiss Aeroplane and Motor Corporation probably carried on the greatest and most wide-spread intercity flying. These activities extended into Canada and Mexico. Altogether, 180,500 machine miles were flown and 6,905 passengers carried, making the equivalent of between 350,000 and 500,000 passenger miles.

The Curtiss Exhibition Company, operating from its Garden City, Long Island, base, flew into New England and as far west as Detroit and Kansas City. In addition to its regular work, it conducted three flying meets, with an attendance of 25,000.

The Curtiss Northwest Company includes in its special service airplane taxis which may be hired from a flying office in one of Minneapolis' leading hotels. Flights to Duluth have frequently been made. On one occasion a flight to Omaha and Kansas City and return was made in 10 hours and 40 minutes—a distance of 1,100 miles. In January, 1922, when the temperature was below zero, 2,500 miles were flown over Lake Superior in search of a lost boat.

Along the Atlantic Coast

Up in Maine, the Atlantic Aero Co. met an emergency by flying a woman from Kennebunkport to Lawrence, Mass. Other parts of New England are covered with safety, despite the rugged characteristics of the country, by such operators as the Brooks, Banks and Smith Corporation of Framingham, Mass.; the Cleveland Air Service, Coventry, Vt.; Concord Aircraft Co., Concord, N. H.; the O. O. Beach School of Flying, Old Orchard, Me., and N. E. Parks, Colebrook, N. H.

In the middle and south Atlantic coast states, Chadwick Bros., of Newark, N. J., have twice flown from Connecticut to Florida. H. E. Cornell of Winter Haven, Fla., with a passenger, flew from Dayton, O., to Walla Walla, Wash., to New York, via Chicago, thence to Winter Haven. The Curtiss Eastern Airplane Company of Philadelphia and Atlantic City frequently makes flights up to 500 miles. Basil L. Rowe, Allaben, N. Y., reports flights through New York

state, Pennsylvania, Ohio and New Jersey. Lawrence Sperry, President of the Lawrence Sperry Aircraft Corporation, Farmingdale, L. I., rarely patronizes the train on his many trips between his plant, Washington and Dayton, O. The Whitted Air Line, based at St. Petersburg, Fla., during the winter months for three years, operates during the summer in various states. In 1922 tours were made by air up the Mississippi river as far as Missouri.

Flight of the "Wilbur Wright"

The Wright Aeronautical Corp., of Paterson, N. J., prepared the way for its entrance into the airplane manufacturing and operating field late in the summer by commissioning its Air Yacht, the *"Wilbur Wright."* The christening of this boat, September 26, at New York, by Miss Katherine Wright, sister of Wilbur and Orville, was a notable event. Shortly afterward, the *"Wilbur Wright,"* with a passenger list of press correspondents, and equipped (for the first time on record) with a 50-watt radio phone transmitting set, with a sending length of 100 miles, was dispatched to Detroit. The all-water route from New York, via river and lakes, to Detroit, was made without incident. During the National Airplane Races, the boat was in constant operation and was then flown back to its eastern base.

Wright Enters Plane Field

The flight of the *"Wilbur Wright"* was the first of a series of important steps taken by the Wright Aeronautical Corporation in expanding its activities. Shortly after the first of the year, F. B. Rentschler, President, on behalf of the Corporation, made the following announcement: "After careful consideration, our company is now providing facilities for carrying on the experimental development of plane types. It is believed that active development of complete units for aircraft will ultimately make for the best product. We expect to have ready for occupation shortly a new plant, constructed alongside our present one, which will house our plane development activities. This plant will be just as modern in every detail as our present one, and will be sufficient to carry out our present program. We are also negotiating for flying facilities at some place adjacent and convenient to Paterson. Because of the intense concentration necessary during the yar, it seemed advisable for our company to devote its entire activities to the development and manufacture of aeronautical engines. It was, therefore, quite natural that at the end of the war period we should continue to engage principally in the manufacture and development

of engines. It is, of course, entirely consistent that the organization bearing the name of Wright should eventually resume the development and manufacture of complete airplanes."

Wright and Lawrance Merge

Subsequently to entry into the plane field, Wright Aeronautical further extended its aeronautical engine line by acquiring the Lawrance Aero Engine Corporation of New York City. Mr. Rentschler said: "The Wright Aeronautical Corporation announces that it has acquired by merger the assets and business of the Lawrance Aero Engine Corporation. By this acquisition, the Wright Company adds to its present line of water cooled airplane motors the Lawrance line of air cooled motors. The Lawrance Company has been the pioneer for some years in the development of air cooled motors and today has the only fully developed line of air cooled airplane motors now being produced in this country. At least, for the smaller powers, this type of motor has been becoming steadily more prominent for airplane use. Therefore, the acquisition of the Lawrance Company by the Wright Company should materially broaden the market for the Wright Company. Charles L. Lawrance, who has been successful in the development of the Lawrance Company business will become Vice-President of the Wright Company and will continue his active work in the development of airplane motors through the medium of the enlarged Wright Aeronautical Corporation."

In Central and Middle Western States

In the great plains region, extending from the Alleghenies to the Rockies, there was continued cross-country flying encouraged almost wholly by reason of the fact that long distances have to be traversed between large centers of population and, as a rule, fast train service, at times when it is desired, is not available. In such instances, the cross-country air taxi meets the western business man's demand for extraordinary transportation. Another important contributory factor in the extension of inter-city flying in the Mississippi Valley states is the nature of the country, the level prairie or farm land being favorable to landing in emergency.

Among those engaged in this type of transportation were M. Aavang, between Chicago and Madison, Wis.; the B. B. & B. Aerial Co., between St. Paul, Milwaukee and Chicago; Behncke's Checkerboard Airplane Service, Inc., within 500 miles of Chicago; Nimmo Black Airport, Inc., Milwaukee, St. Louis, Omaha, Dayton and Indianapolis; Bowen & Huston, St. Louis and Kansas City; William A. Burke, Okmulgee, Okla., Oklahoma City and Wichita, Kan.;

Cochrane Aviation Co., Denver, Colo., and Cheyenne and Laramie, Wyo.; Diggins Aviation Co., various points in the middle west, operating out of Chicago; Oliver Gies Airplane Co., Great Falls, Helena and Butte, Mont.; A. E. Merriam, points in Oklahoma and Texas; Huff Daland Aero Corp., Kansas City, Omaha and Chicago; Lucas and Roy D. Hume, Arkansas City, Ark., Tulsa, Okla.; Indian Lake Aviation Co., Ohio and Indiana; J. L. Aircraft Corp., through the middle west; Johnson Airplane and Supply Company, Ohio, Indiana, Illinois, Michigan; Kokomo Aviation Corp., Cincinnati, Louisville, Indianapolis, Chicago, Detroit; L. M. C. Drilling Co., Kansas, Nebraska, Oklahoma, Texas, one flight, Okmulgee to Chicago, between daylight and dark; J. K. LaGrone, Nebraska and Missouri; E. M. Laird Airplane Co., many trips up to a thousand miles or more from Wichita, Kan.; L. W. Leib, the Dakotas, one trip of 33¾ hours in pursuit of convicts over Missouri bad lands; Longren Aircraft Corp., Kansas and Oklahoma; R. W. Mackie, Texas and Louisiana; R. A. Northrup, Kansas and Oklahoma; Robertson Aircraft Corp., St. Louis, Mo., Springfield, Ill., Jefferson City, Mo.; Mac Short, Kansas, Missouri and Nebraska; Southwest Airplane Co., 350 miles around Tulsa; Marion Sterling, Texas; H. W. Tennant, North and South Dakota and Minnesota; Wallace Bros. Aero Co., Iowa, Illinois and Missouri, and Westover's Standard Aircraft Co., across the Rockies.

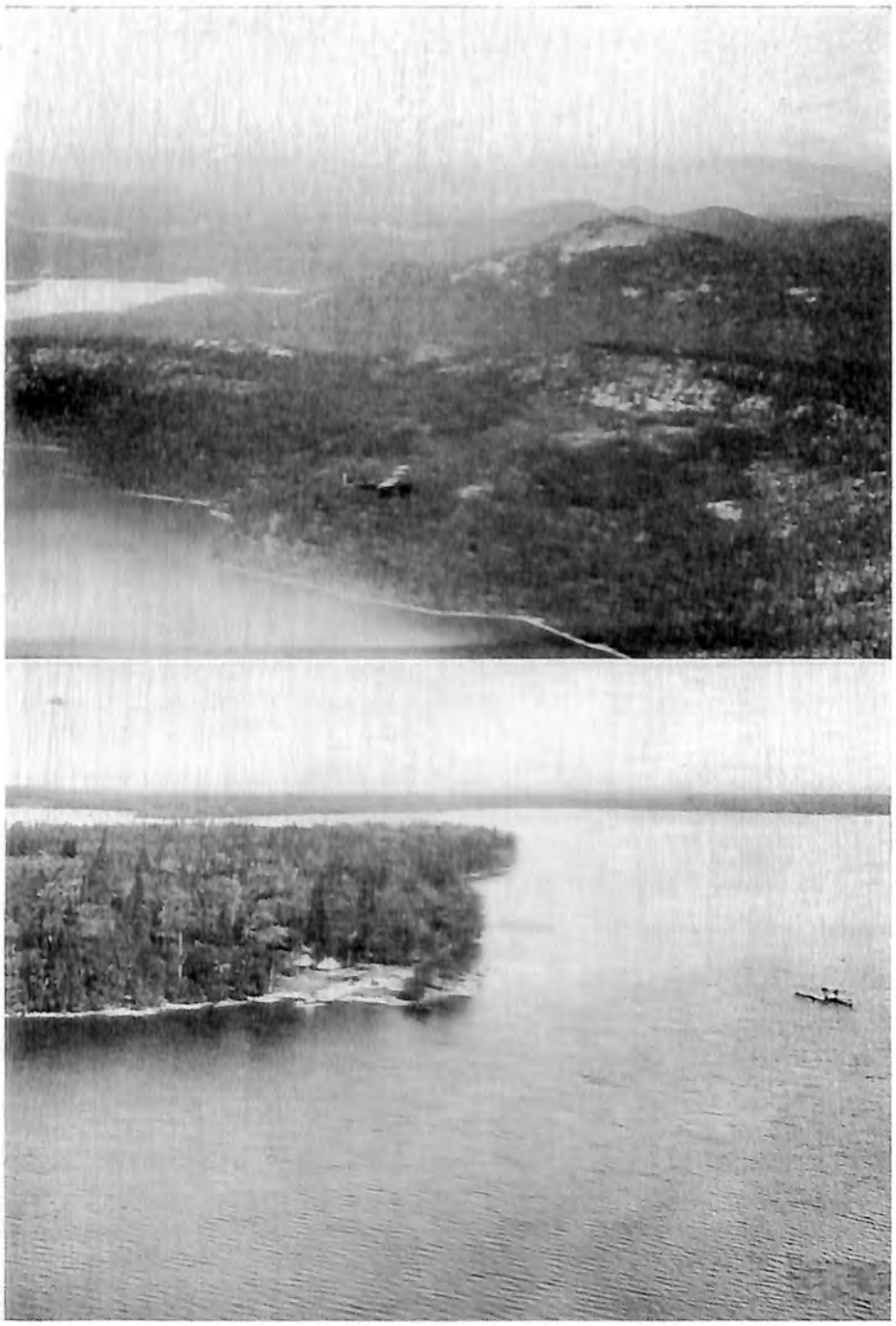
On the Pacific Coast

In the far west, L. C. Brand, a Los Angeles banker, uses his airplanes (he has three, with his own fields, hangars, repair facilities, etc.) to transport his family and friends on business and pleasure trips to San Francisco, San Diego and Phoenix, Ariz. Earl S. Daugherty covers Southern California from his field at Long Beach. F. W. Farris, of Stockton, flies through the San Joaquin Valley. Carl Gritch operates between various points in Washington.

Others in far western and Pacific Coast states were: A. W. Hansen, northern California; Jack A. Hensel, Spokane and Wenatchee, Wash.; Pacific Airways, the Puget Sound country; C. O. Prest, Las Vegas, Nev., to Alaska, and the Foster Russell Aviation Co., Washington, Oregon and Idaho.

Forest Patrol and Timber Cruising

Of the varied special services performed by aircraft probably the most interesting and possibly the most valuable, when the value of property conserved is considered, are forest patrol and timber



Forest Patrol Plane in California.—Photo, U. S. Army Air Service.—
Below—Remi Lake Station, Laurentide Air Service.

The New Wright All-Metal Pursuit Plane.—Photo J. A. Davis, N. Y. C.

cruising. As in many other phases of commercial aviation, the Army Air Service has pointed the way in the forest patrol.

During the summer of 1922 the forest patrol was jointly operated by the Army Air Service and the Forest Service over the timber region of Oregon, and also for a short period in California. The system employed was a radical departure from the organization of previous years. Formerly patrols were flown at regular intervals over certain designated routes between definitely established bases and sub-bases. In 1922 the planes were held at base subject to call from Forestry officials and were used at different times for scouting purposes during unusually hazardous fire periods. In the California district 22 flights were made. Ten of these were over Santa Barbara Forest, using Santa Barbara as a base.

In the North Pacific district 125 flights were made during the season, Eugene being the main base with Medford, Roseburg and Portland (all in Oregon) as landing points. The total area observed was about 2,153,370 square miles; the total number of miles flown 36,121. Four hundred and fifty-eight fires were discovered, of which number it is estimated that approximately 114 fires were discovered first by airplane—and it must be remembered that planes were flown only on call. Ten airplanes were in commission.

Millions of dollars worth of standing timber was saved, it is estimated, through prompt reporting and checking of conflagrations.

It is an astounding fact that the United States Forest Air Patrol, which has been so effective that private timber corporations in the northwestern states and in Canada are installing their own air branches, is at the time of publication threatened with discontinuation. The flights are made jointly by the War Department and the Department of Agriculture. Although both departments have urged its development, the necessary appropriations have been withheld and the Air Service, curbed and checked in other ways in the use of its equipment, may be forced to abandon its good work.

The obvious value of the air patrol to the lumberman is the saving of time and the advantage of dominating elevation. By an effective combination of aerial photography and personal observation, patrol is joined with cruising, transportation and many other services. A Curtiss *"Oriole"* from the Foster Russell field in Spokane, made one flight of 200 miles in about two hours and a half with a cruiser aboard, thereby satisfactorily performing work which would have required weeks on horse and afoot.

In Canada the Spanish River Pulp and Paper Mills, Sault Ste. Marie, Ontario, and Laurentide Air Service, Ltd., Montreal, have carried on extensive aerial activities. At the request of the former

the Dayton Wright Company of Dayton, O., designed, constructed and operated two special forest patrol-photographic seaplanes. Laurentide Air Service, employing Curtiss and Loening land and water craft, and a British amphibian, during 1922, patrolled 11,175 square miles of territory for fires. Twelve thousand square miles of territory between Transcontinental Bay and Hudson Bay were mapped for the Ontario government.

Special and Unique Services Performed

Commercial aircraft again served newspapers. Many publications at first utilized planes for publicity. As this no longer was novel, in 1922 many patronized operators as they would a taxi company for the transportation of reporters and photographers or of the editions themselves. This required much night flying, particularly for the Chicago Tribune (which also has several planes of its own) and the Chicago Herald-Examiner.

While not performed by commercial planes, certain achievements of the Army and Navy should be recorded here as indicating the scope of commercial activity. At the time of the Argonaut mine disaster in California, surgeons and supplies were flown to the scene by the Army. The Army also figured in rescue work in the Texas floods. Naval planes were utilized to salvage a wrecked ship off Hawaii and on one remarkable occasion a seaplane alighted near a burning fishing vessel, took aboard the five survivors who were clinging to wreckage and carried them ashore.

A new activity in which comparatively little has as yet been done, but which promises much, is the dusting, with chemicals, of infected crop or orchard areas. Experiments in 1921 in Ohio proved that airplanes could do this work. The idea was further pursued in 1922 by the Department of Agriculture and definite progress was made in finding new ways to combat wheat rust and the boll weevil, so destructive to two of the major crops of the country.

A curious contribution was the part played by a Naval seaplane in facilitating mollusk research in Florida waters by the Smithsonian Institution. Writing to the Chief of the Bureau of Aeronautics, officials of the institution said new possibilities in scientific study of marine life were thus opened up.

The Alabama Power Co., upon whose long distance hydro-electric service great areas in the South depend, was confronted in the winter of 1922 with an alarming situation due to a sleet storm. The high tension wires were broken in many places. To have inspected the lines on foot would have meant days' delay. By using

an airplane, flying low, officials found the breaks, rushed out repair gangs and by night the entire system was functioning.

In the field of advertising aircraft made much progress due principally to the utilization of the aerial photograph and to the introduction into this country of the British method of "sky-writing," horizontal flying at sufficient height, the plane discharging smoke which, according to the state of the atmosphere and the skill of the pilot, left in the sky words and slogans of commercial significance. Demonstrations in many of the larger cities have proven that this novelty is profitable to advertiser and flier. With the extension of night-flying pyrotechnic possibilities promise interesting developments.

Aerial Photography

During 1922 aerial photography developed into one of the most important and immediately profitable branches of aviation. The acceptance of the aerial photograph as an aid to industry, engineering and advertising, has been due largely to the efforts of several of the larger aerial photographic organizations, among which are the Fairchild Aerial Camera Corp., General Photographic Service and Hamilton Maxwell, Inc., of New York; the Eastman Kodak Co., of Rochester, N. Y.; National Aircraft of Washington, D. C.; Great Lakes Aerial Photographic Co., of Cleveland, O.; Pioneer Engineering Co., of Los Angeles, Cal., and Fairchild Aerial Surveys Co. (Canada), Ltd., of Grande Mere, Quebec. In addition to these, Aeromarine Airways, the Curtiss Exhibition Corp., Curtiss-Northwest Airplane Co., Foster Russell and others have carried on aerial photographic work.

Aerial photography is divided into three classes—oblique or perspective; mosaic or survey, made up of vertical views, and the small scale plan map. Each class serves a distinct public need.

Of the corporations engaged exclusively in aerial photography, the Fairchild companies have been the most active. During 1922 their machines flew about 200 hours, operations being conducted in many parts of the country. Fairchild has developed many new uses for the aerial photograph. Among these are the following: A company was formed for the organization of a new golf club, appealing to wealthy residents in and near New York City. To obtain the right kind of charter members complete visualization was necessary. Oblique views from the air provided the answer. In another instance, an engineering company, supervising a contract for clients 3,000 miles distant, were able, by means of oblique photographs, to illustrate progress on a vast jettie development. In yet another instance, where

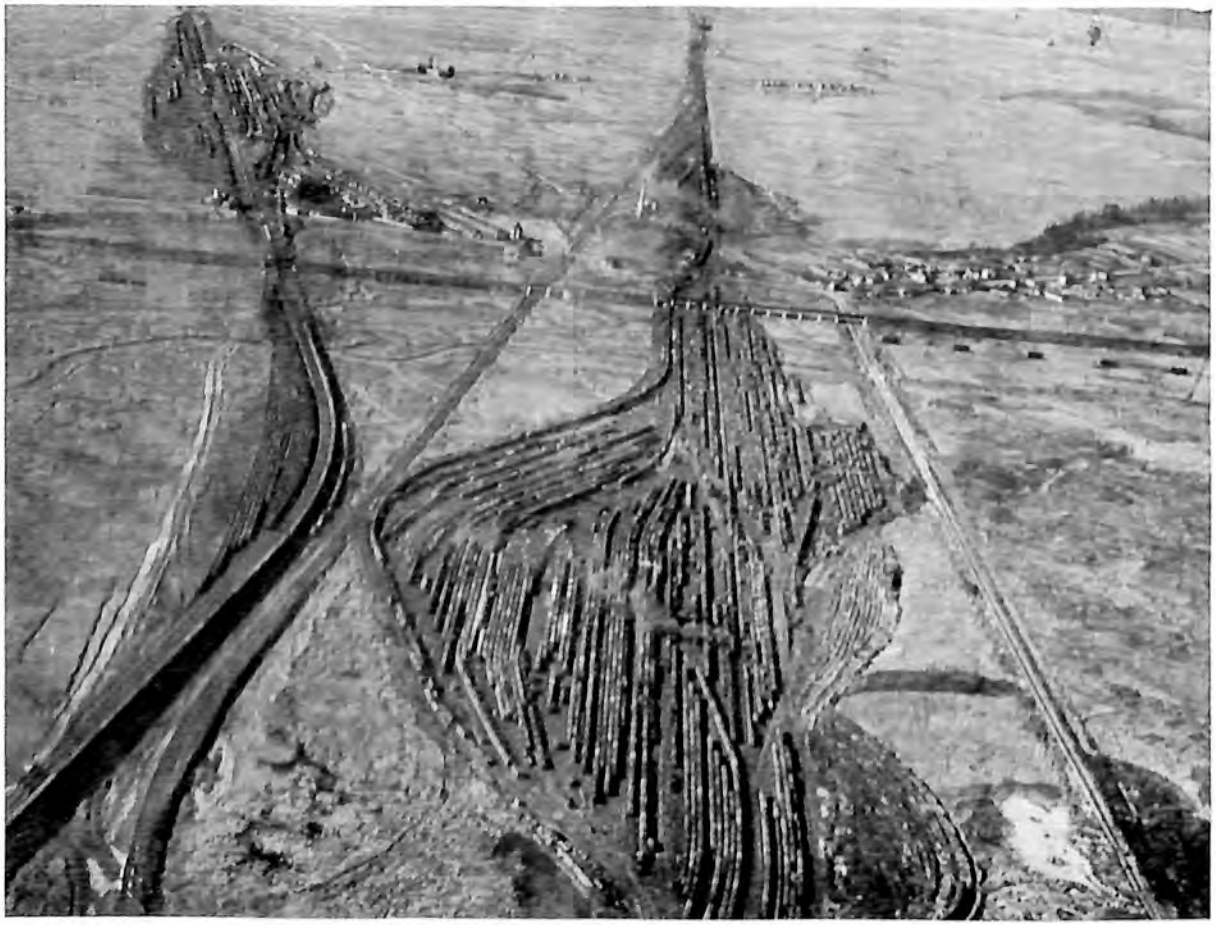
property rights were involved, the claimant was able to show to the court and jury the effect of the sea on his land and thereby establish the injury suffered because of inadequate shore protection by the Government. Many instances have arisen of industrial plants reproducing aerial photographs as a part of institutional advertising—illustrating the character and stability of the organization.

Use in Municipal Surveys

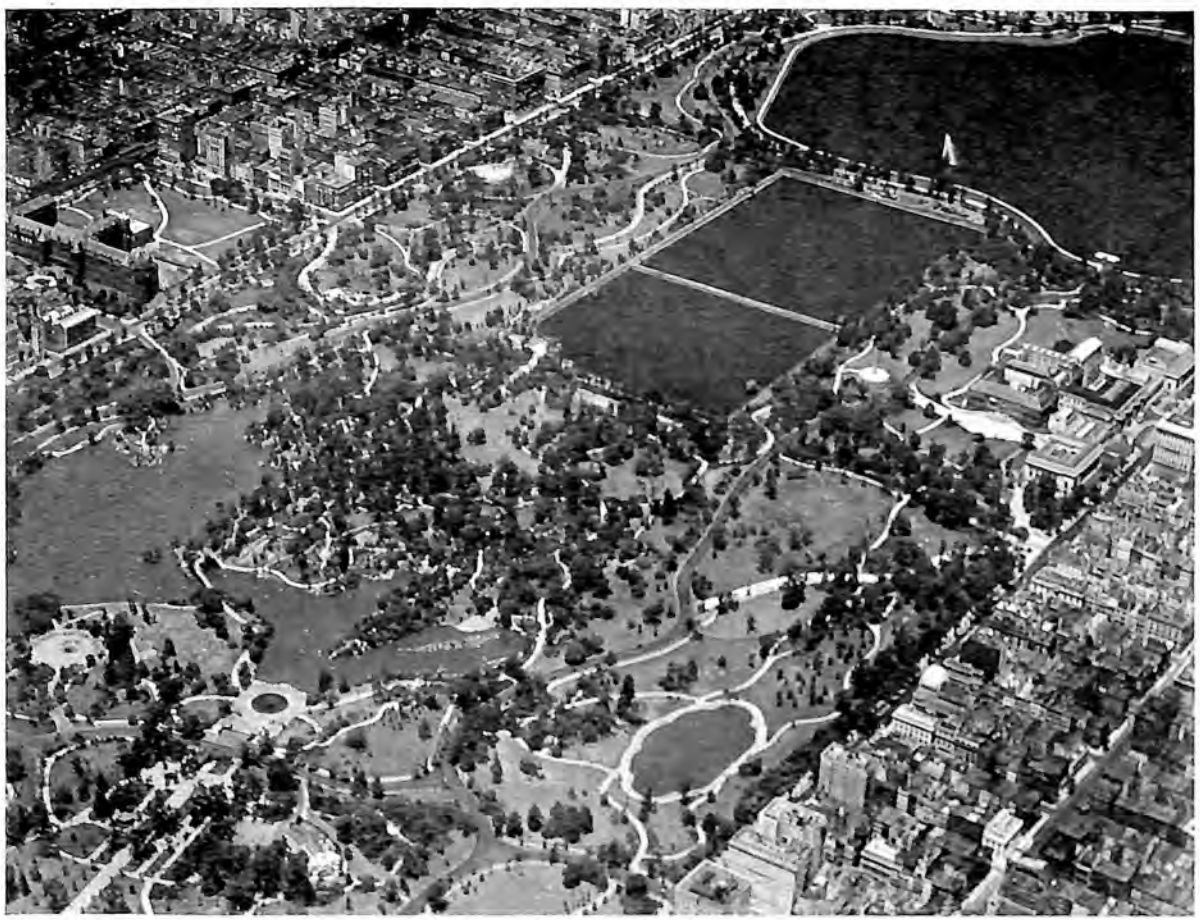
Intense interest by City Planning Commissions is reported by Fairchild. Both oblique and vertical types are utilized. The oblique view has been employed in zoning work problems, both as to correction of past errors and prevention of future ones. One of the first municipalities to adopt the aerial photographic map as a part of the fundamental city plan equipment was Kansas City, Mo., covering an area of more than sixty square miles, with differences in elevation amounting to 600 feet. Fairchild constructed a map consisting of 760 different photographs in ninety days from the time the contract was awarded. The scale of the map was 600 feet to one inch. This map has been carefully gone over by members of the commission and other officials and is regarded as invaluable. The city engineer said of it: "The entire map scales as closely as the usual city map prepared on the drafting table and sets forth the city as it is more clearly than any other kind of map possibly could."

A significant development in this branch of aviation was the adoption of the photographic map by such power companies as the Public Service Electric Company of New Jersey and the Alabama Power Co. of Birmingham, Ala. The especial application of the air map has been to the laying out and purchasing of rights of ways, which has long been a difficult and expensive problem, entailing destruction of surface property and sometimes such speculation in ground values as to imperil the whole project. When the Public Service Company first considered air photography, they asked: "How can we find the actual property line?" This question was answered by Fairchild engineers who, by studying the actual public records, superimposed on the air map in bright inks the outlines of each land parcel, together with a key to the ownership.

The large timber companies of Canada have long been seeking a speedier and more economical method of cruising timber. Experiments carried on by the Laurentide Company led to great extension and in 1922 the Fairchild Aerial Surveys, Ltd., of Canada, was formed to take over the photographic work. More than 3,000 square miles have been surveyed from the air and timber estimates furnished



The congestion of freight in New Jersey is a question of vital importance to New Yorkers. The Erie Railroad in a study of its terminals resorted to aerial photography. The above photograph shows their Secaucus Yards.—Photo, Fairchild Aerial Camera Corp.



Metropolitan Museum of Art (on right) and the American Museum of Natural History (upper left) petitioned the Board of Estimate of New York City to construct a Boulevard across Central Park to be called Roosevelt Drive. They presented their evidence, showing the route of the proposed road by the above photograph.—Photo, Fairchild Aerial Camera Corp.

in one-third the time the same information could have been secured on the ground at approximately two-thirds the cost and with an accuracy far greater than that obtainable from surface surveys.

As new problems arise, and new opportunities for the application of aerial photography are discerned, there is need for better equipment. Both Fairchild and Eastman during the year brought out many improvements in cameras, film and accessories and these, in turn, have greatly stimulated commercial application of the art.

Reducing Charges for Air Service

Although young, commercial aviation is old enough to enable one to study the progress made in overcoming certain difficulties, which may, roughly, be termed knowledge of costs, profitable utilization of equipment, the gypsy pest and the air terminal.

In discussing the experiences of Aeromarine there was clear illustration of the scientific study of costs. But, unfortunately, most of the operators have not the facilities for such observation and have been forced to learn through hard and sometimes disastrous experience. Examination of such reports as are available indicates that the fixed-base operators were at first very liberal with complimentary flying and careless with equipment. Also, prices at first charged for flights were high. The realization that, as curiosity waned, prices would have to decrease, forced examination of expenditures. With a steady reduction in average charge per short flight and per pound-mile and passenger mile, has come also prolonged use and conservation of equipment. Thus:

	1920	*1921*	*1922*
Average charge per short flight	$12.50	$9.00	$7.00
Charge per pound of freight per mile	Unknown	.33	.036
Charge per mile, intercity flight	.65	.55	.428

An illuminating feature is the fact that those companies who were first to endeavor to discover what it cost them to operate, and scaled fares and charges accordingly have, in most cases, been the ones to survive the severe test of operation for the last three years. Also, as in the case of Aeromarine, those operators that learned costs were the ones, as a rule, to get the most out of their equipment.

Cross-country taxi flying is, as a rule, harder on equipment than regular operation between terminals. But according to reports submitted, and which the Chamber believes to be correct, there are many instances of planes three years in continuous operation. One ship has a record of 500 hours or 45,000 miles. Another, in the last two years, has traversed fifteen states. Earl Daugherty opened his Long Beach, Cal., school in 1919 with a Curtiss JN, OX-5 motor,

and at the end of 1922 both plane and engine were still in operation. A Laird *"Swallow"* is reported in service two years with never a broken part, and in this time carrying 3,400 people. A southern operator says he has flown for the last four years in thirty states and his engine is still in good shape. A North Dakota flier bought a rebuilt Curtiss OX-5 engine, and after 600 hours in the air he reports it functioning satisfactorily.

Equipment Long in Use

Many other examples of ships 30,000, 35,000 and 45,000 miles in the air are cited. Probably the most significant feature of these reports is the knowledge that about 90 per cent, or even more, of the equipment employed in cross-country work represents the Curtiss or Curtiss-Standard training equipment produced during the war.

The oft-repeated query, "What shall be done with the gypsy flier?" will shortly, it is predicted, answer itself. He will either "go broke" or "go bust." There would be some immediate hope for both were it not for the fact that the War Department continues to hold sales of surplus war material at bargain prices. Most of the better material having been disposed of, much of what remains consists of pursuit types of ships and engines—especially unsuited for cross-country flying, dangerous for passenger-carrying and, by reason of design and speed, a constant incentive to stunting, which is, of course, the gypsy's bread and butter.

Add to this condition the reports in the press (which undoubtedly have some basis in fact) of rum smuggling and drug running, not to mention the too-frequent casualties, and the irresponsible itinerant is seen in perfect flower.

Yet there is hope that the surviving gypsies will reform. As one wrote to the Chamber: "The time is now here when we must forsake barnstorming for permanent flying fields if aviation is to get anywhere." To cease roving is not necessarily to cease demonstration flying without passengers, at proper heights and with proper safeguards. State and county fair boards are learning to discriminate between the responsible and irresponsible flier, so that in 1922 numbers of itinerants settled down, while other fixed-base operators found a welcome income from sane demonstration flying at fairs or meets. According to reports submitted to the Chamber, 492 fairs included aviation on their programs. These fairs were attended, it is estimated, by 9,232,500 persons.

To do justice to the gypsy, the following is quoted from a letter recently received:

"The gypsy flier is the man that kept aviation alive after the war by flying in the country districts, far from established airplane fields. He is usually a good fellow, always broke, full of hopes, and if he sticks long enough, will be a good pilot, as he hits more cornfields than aviation fields. His ship is usually in poor condition, due to the fact that he has no shelter for it and as a rule can not afford to repair it unless absolutely necessary. More often than not it was a condemned war plane when he bought it. My experience as a gypsy flier has convinced me that it does not pay. The public has not enough confidence in aviation to ride with a man they have never heard of and though I tried to get passengers to ride for $2.50, they went instead to a field run under the same management for some time, and paid $10.00. They had heard of the pilot, he was well known in their section and belonged to a lodge. His ship was in good condition, and storms of the season had left their mark on my old ship. The man flying from an established field has more of an opportunity to get by than the gypsy flier, as he can usually fly with newspapers as freight, and gets the same passengers, who, as their confidence grows, use his plane as transportation for business trips that are important."

Need for Better Air Terminals

As cross-country taxi flying is the next step to regular air service, and as regular air service can no more operate without terminals than can steamers or railways, the proper air routes and fields or ports are seen to be imperatively needed.

As is discussed in the chapter on Air Law (No. VII), air terminals should be publicly provided, and their establishment will be accelerated if and when a Federal air law is enacted. But until this law is passed something should be done. Recapitulation of returns shows a decrease in fixed-base terminals from 146 to 133 and public fields used from 16 to 10, although the number of operators increased from 125 to 129. This apparent discrepancy is explained by the fact that operators are concentrating at terminals for reduction in overhead. This is a good sign; but it would be a far better sign were there in existence a national policy designed to guide and counsel municipalities in the establishment of public terminals. It is almost a tragedy of the business that, in their enthusiasm, nurtured perhaps by promoters, cities will spend thousands of dollars for a field and then, after the opening meet, see it unused by an airplane for a year.

The remedy is not fewer fields, but better fields more wisely located. Fields and terminals established according to natural commercial routes, not according to local fervor or whim, are essential. Given them, the fixed-base operator will be able to figure more certainly on the cost and practicability of *regular* cross-country flying, which, of course, means air transport on schedule.

The Aeronautical Chamber of Commerce, in co-operation with

the Air Services of the Government, is doing what it can to correct this situation. Especially constructive work is being done by the Airways Section*, U. S. Air Service, in charge of Captain Burdette Wright. A list of air ports compiled by the Aeronautical Chamber of Commerce late in 1922 indicated that, of 3,000 reported to be in existence, fully 2,500 were utterly unimproved, 140 were designated as Government; 160 as municipal or state, and 200 as "commercial."

Without proper marking, classification and preparation, and without being knit together into one great comprehensive national scheme of airways, these facilities are about as useful to commercial aviation (and to the national defense) as rail or water terminals would be without system, organization and regulation.

"Give us air law, designate air routes and guide the establishment of municipal air terminals," the permanent operators say, "and we will demonstrate our faith by our growth."

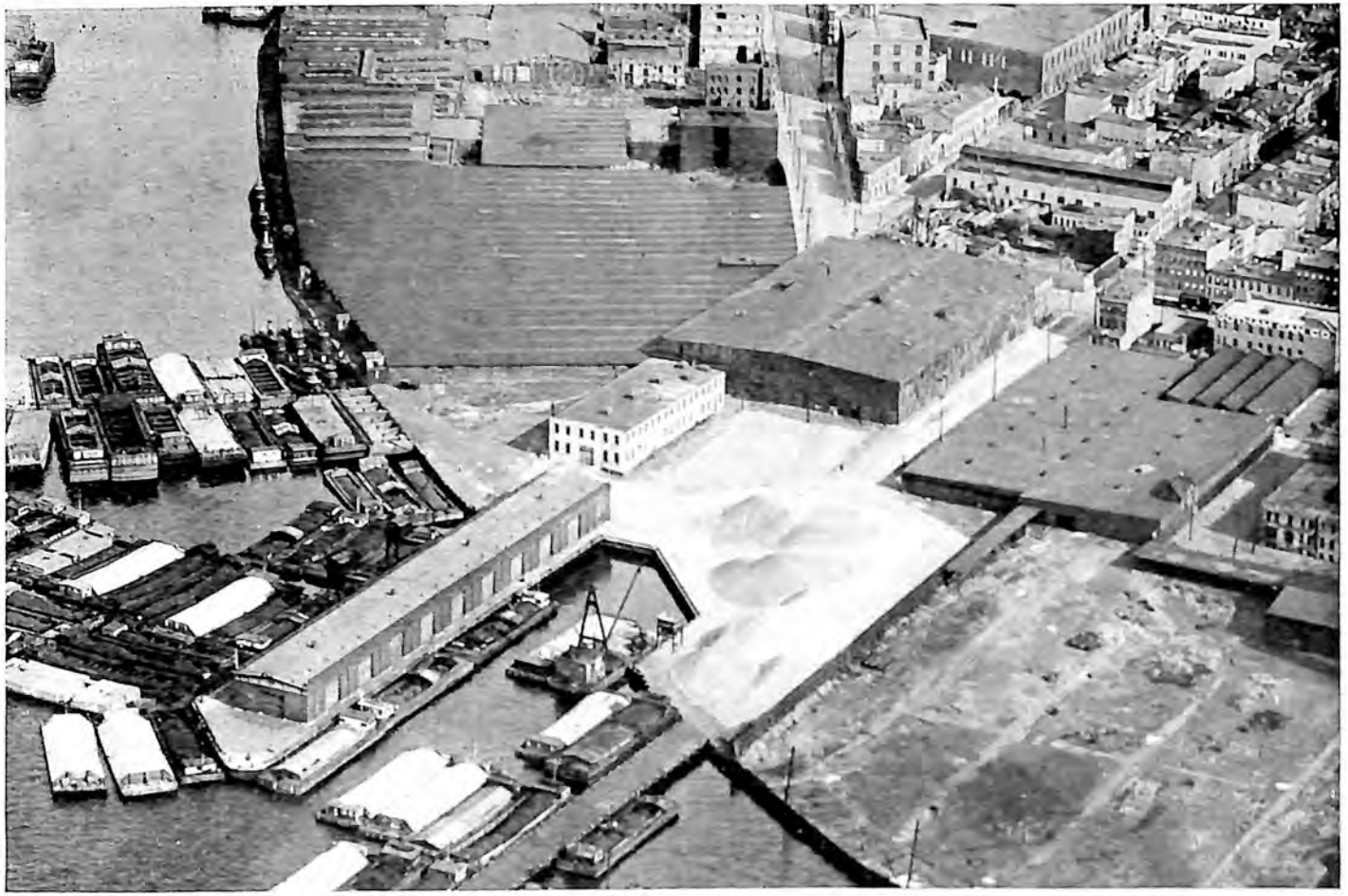
* See U. S. Air Service Section, Appendix.

TABLE OF AIRCRAFT OPERATORS IN THE UNITED STATES AND CANADA

The following pages represent data submitted to the Aeronautical Chamber of Commerce by aircraft operators. Efforts have been made wherever possible to check these figures but the Chamber can assume no responsibility for errors in reports made to it.

Name of Company	*Address*	*Air Port Facilities*	*Shop and Repair Facilities*	*Equipment*
M. Aavang	115 Throop Ave., Woodstock, Ill.	Hoffman Field (leased), McHenry Ave., 40 acres	None	1 J.N.-4-D. (OXX6)
Aerial Transport & Engineering Co.	Roosevelt Blvd. and Cottman St., Philadelphia, Pa.	Field (owned) 25 acres; hangar 480x400x35	Fair	1 A.-39-B (W.150 h.p.) 1 A.(OXX6, 100 h.p.) 1 N.-9 (OXX6, 100 h.p.) 1 Fm.
Aeromarine Airways, Inc.	1800 Times Bldg., New York, N. Y.	Terminals, Keyport, N. J., New York, Atlantic City, Detroit, Cleveland, Key West, Havana, Palm Beach, Miami, Bimini, Nassau and San Juan	Excellent Keyport, N. J., Detroit, Mich., Key West, Fla., San Juan, P. R.	8 A.-Navy 11-pass. Flying Cruisers 17 A.-Navy 5-pass. Flying Boats 5 A. 3-place Flying Boats
The Airline Transportation Co.	The Stillwell Hotel, 833 South Grand, Los Angeles, Calif.			
American Aircraft, Inc.	Sta. F, Box 104, Baltimore, Md.	Logan Field, Dundalk, Md. (leased), 16 acres; hangar 60 x 80	Complete on field.	2 Can. J. N. (OX5) 1 P. (OXX6) 1 A. C.—1 monoplane (80 h.p. LeR.)
American Airways	College Point, L. I., New York	Field (leased) 10 acres; hangar 2 stories; 15,000 sq. ft.	Complete.	4 H. S.-1-L. 1 A.-40; 5 MF.
Vincent Astor	New York City	Port Washington, L. I.		1 Lo. A. Y.
Atlantic Aero Co.	19 Lexington Street, Lynn, Mass.	Terminal Ocean Pier, Revere (leased)	Excellent repair facilities	1 C. F. Flying Boat (OXX3) 2 C. Navy-MF Flying Boats (2 OXX-6)
Aurora Aviation Co., Inc.	R. D. No. 1, Aurora, Ill.	Field (leased) 40 acres; hangar (process of construction) 70 x 55	Minor repairs	1 J. N.-4-D (OX5) 2 S.J.-1 (OX5)
B. B. & B. Aerial Co.	603 W. B Street, Marshfield, Wis.	Field (so side of town) leased; 25 acres		1 S.J.-1
Behncke's Checkerboard Airplane Service, Inc.	Forest Park, Ill., Box 81	Airdome (Desplaines River and Roosevelt Road) equipment owned, land leased; 65 acres; hangar standard Army size	Complete	1 Br.-5 pass. 5 J.N.-4-D 1 504-K, etc., etc.
Nimmo Black Airport, Inc.	3000 Peterson Road, Chicago, Ill.	Field (leased) 50 acres; hangar (6 to 8 planes) 68 x 75	Fair	2 *Swallows* (OX5) 5 J.N.-4-D (OX5)
Blackstone Hill Aero Club	404–29th Street, Oakland, Calif.	Field (opp. Govt. Isle, Alameda Estuary) leased ¼ acre; hangar 65 x 35	Winch and work bench	1 S.H.-4-H. Seaplane (H.S.A.5-A. 180 h.p.) 1 J.N. (OXX3)
Bowen & Huston	Windsor, Mo.	Field (leased), 40 acres; hangar	Ordinary	1 J.N.-6-H (W. type A. 150 h.p.)
L. C. Brand	Glendale, Calif.	Field (owned) 15 acres; hangar 80 x 80	Both	1 J.N. (W.) 1 Fk. (H.S.-L. 6) 1 LeP. (L.)

For years the United States Government has been trying to straighten the channel in the Harlem River at its intersection with the Hudson. Through the judicious use of aerial photographs, the condition was shown to the Government, and a commission is now sitting to determine the value of the property to be destroyed.—Photo, Fairchild Aerial Camera Corp.



Sand pile and White Building, with pier. In the center of picture is one of the terminals of the New York State Barge Canal. Photograph was taken for the French Government to show the property on each side of the Barge Canal terminal. It was used during the war as a storage warehouse. The property is now for sale.—Photo, Fairchild Aerial Camera Corp.

Total No. Flights	Average Duration of Flights	Total Mileage	Passengers Carried	Lbs. of Freight	Charge per Short Flight	Charge per lb. of Freight	Charge per Mile Inter-city Flights	Operating Territory
300	20 min.	7,000	200	0	$10.00		$ 0.50	Chicago & Madison, Wis.
					5.00		.65 average	Philadelphia and Atlantic City (occasionally)
2,125	1 hr.	739,047	9,107		5.00		.33⅓	New York-Atlantic City, Cleveland-Detroit, Key West-Havana, San Juan P. R.; N. Y.-Havana; N. Y.-Albany, Lakes George and Champlain
300	20 min.	8,000	150	700	1.01 per minute	½c per lb. over 20 miles; 100 lbs. minimum	.50	Washington, Baltimore and Eastern Shore.
50	20 min.	1,500	75		10.00			New York-Atlantic City; New York-Detroit; New York-New London, etc.
		9,000	200		private use			New York, Newport, Martha's Vineyard, Bar Harbor, etc.
1,300	8-9 min.	10,000	2,430		2.50 to 20.00			Revere & Nahant, Revere & Lynn
300	20 min.	1,250	290		10.00	.07½	.50	Chicago, Aurora
600	10 min.	4,200	300		5.00		20.00 per hr.	St. Paul, Milwaukee, Chicago
	10 min. to 5 hrs.				10.00		.40 per mile in lots of four	Within 500 miles of Chicago
600	40 min.	26,000	700		10.00		1.00 one or two pass. 20c return	Milwaukee, St. Louis, Omaha, Dayton, Indianapolis, etc.
50	20 min.	1,000	20					Over San Francisco Bay
236	15 min.	4,130	156		10.00			Kansas City and St. Louis
100	10 min. to 3 hrs.	4,000	50		private use			Los Angeles to San Francisco, San Diego, Phoenix, Ariz., etc.

Name of Company	*Address*	*Air Port Facilities*	*Shop and Repair Facilities*	*Equipment*
Brooks, Banks & Smith Corp.	Framingham, Mass.	Field (Army), 125 acres; hangar for 6 planes	Good	1 504-K
William A. Burke	622 E. 12th Street, Okmulgee, Okla.	Field (leased) 80 acres; hangar 60 x 90	Fair	1 *Swallow* (OX5, 90 h.p.) 1 Ld. Scout (Gn)
Burns Flyers	609 So. Leroy Street, Fenton, Mich.	Field (leased) 20 acres	Garage in town	3 S.J.-1 (OX) 1 LeP. Spec. (W. 220 h.p.)
Cantwell Aircraft Co.	Bucklin, Mo.	Field (leased) 40 acres	Fair	
Central Missouri Aviation Co.	W. North Street, Marshall, Mo.	Field 1 mile s. w. of town, 80 acres	Parts, supplies, gas and oil	1 Can. J.N.
Chadwick Bros.	150 Broad St., Newark, N. J.	Brainerd Field, Hartford, Conn. (owned by city), 90 acres		1 S.J.-1 (OX5) 1 J.N.-4-D. (OX5)
Cleveland Air Service	438 Main St., Coventry, Vt.	Field (owned) 5 acres; hangar 55 x 35	Workshop with small tools in hangar. Garage ½ mile.	1 S.J.-1 (C.-6, 160 h.p.)
Cochrane Aviation Co.	Box 641, Casper, Wyo.	Field (leased) 40 acres; hangar 30 x 50	To be equipped	1 S.J.-1 (W. 150 h.p.)
Concord Aircraft Co.	65 No. Main Street, Concord, N. H.	Field (State Mobilization) 1 mile long, ¼ mile wide; hangar (4 barracks)	Good	1 L.S.-1, 3-pass. (W. 150 h.p.) 1 MT-2, 3-pass. (W. 150 h.p.)
H. E. Cornell	Winter Haven, Fla.			1 L.V.G. (250 h.p. Benz)
E. C. Curran	Spearfish, So. Dak.	Field (donated) 40 acres; hangar 48 x 30		1 S.J.-1 (OX5)
Curtiss Aeroplane Export Corp.	52 Vanderbilt Ave., New York, N. Y.	Fields (leased) Buenos Aires, Arg.; Sao Paulo, Brazil, Lima, Peru, Santiago, Chile.		*Orioles*, *Seagulls*, J.N.'s, S.J.-1's, with K-6 or C-6
Curtiss Aircraft Corp.	Dallas, Tex. Branch	Love Field (leased from U. S. Govt.); 5 hangars, storage; 1 hangar service	Complete	Stock of 300 J.N.-4 planes (OX5); 1 C-6, 1 S.J.-1; 2 J.N.-4
Curtiss Eastern Airplane Co.	Atlantic City, N. J.	Terminal Atlantic City; Field Pine Valley, N. J. 100 acres; both leased; 3 hangars, (2–75 x 100; 1–200 x 85)	Good	1 *Oriole* (OX5) 1 *Oriole* (K. 6) 1 S.J.-1 (K. 6) 2 J.N.-4-D. (OX5) 3 *Seagulls* (K. 6) 1 *Seagull* (1922 model) 1 M.F. Flying Boat 1 Fm. Sports
Curtiss Exhibition Co.	Buffalo, N. Y.	Field (leased), 300 acres; 2 hangars, 60 x 60	Minor	2 S. (K.-6); 1 J.N.-4-D.; 1 S. (OX)

No. I—Continued

Total No. Flights	*Average Duration of Flights*	*Total Mileage*	*Passengers Carried*	*Lbs. of Freight*	*Charge per Short Flight*	*Charge per lb. of Freight*	*Charge per Mile Inter-city Flights*	*Operating Territory*
400	20 min.	12,000	600	1,000	$7.50		$ .25	All New England, except Maine
175	1 hr.	13,125	95		7.50		.30	Okmulgee, Oklahoma City, Wichita, etc.
1,600	20 min.	28,000	1,100		5.00		.50	Detroit and Jackson, Mich.
100	30 min.	5,000	25		5.00	$30.00 per hr. 150 lbs. maximum	30.00 per hr.	
100	20 min.	3,000			private use			
500	30 min.	17,000	300		12.50		.70	Hartford and New York
500	22-5 min.	10,000	784		7.50 to 10.00		.50-1 .75-2	Newport to Burlington, Vt., Boston, Mass., St. Johnsbury, Vt.
1,500	10 min.	16,000	300		15.00 2-pass.		.30	Douglas, Glendo, Wheatland, Cheyenne, Denver, Laramie
302	20 min.	8,000	378	500	5.00 to 7.50		.65	Concord, Manchester, Franklin, Tilton, Laconia, No. Conway, Bethlehem, Lancaster, Newport, Bridgeton, etc.
75	1 hr. 30 min.	1,000			personal use			Lakeland, Tampa, Daytona, Jacksonville, etc.
80	30 min. to 2½ hrs.	1,800	40		6.00			Bellfourch, Sturgis, Lead City, So. Dak., etc.
1,200	12 min.	18,000	960					Various South American cities
50	30 min. to 2 hrs.	3,000	20	1,000 lbs. films		40c	.40 mile, $50 hr.	All points in Texas and Oklahoma
2,100	15 min.	32,000	1,500		10.00		.75	Anywhere within 500 mile radius of stations
450	15 min.	6,500	425		10.00		.30 per pass. mile for 2 pass.	Cleveland, Rochester

Name of Company	*Address*	*Air Port Facilities*	*Shop and Repair Facilities*	*Equipment*
Curtiss Exhibition Co.	Garden City, N. Y.	Field (owned) 160 acres; 16 hangars	Curtiss Factory	5 J.N. (OX-5) 5 *Orioles* (C.-6) 1 *Oriole* (K.-6) 1 *Oriole* (OX5) 2 S.J.-1 (C.-6) 1 H.P. (2 R.R.) 1 D.-Pusher (OX5)
Curtiss Northwest Airplane Co.	Curtis Hotel, Minneapolis, Minn.	Field (leased) Corner Snelling and Larpenteur Aves. (opp. State Fair Grounds), midway bet. Minneapolis and St. Paul; 60 acres; hangar 64 x 70	Motor shop, fuselage shop, motor test stand, gasoline station, equipment for night flying	2 *Orioles* 2 S.J.-1 (K.-6) 2 S.J.-1 (OX) 2 J.N.-4-D
Curtiss Wisconsin Aeroplane Co.	330 Clinton St., Milwaukee, Wis.	Milwaukee Air Port (leased), 160 acres; hangar 50x50	Good	1 S.V.A. (SPA., 240 h.p.) 1 Can. J.N. (OX5) 1 S.J.-1 (C.-6 160 h.p.)
Earl S. Daugherty School of Aviation	431 E. Seaside Blvd., Long Beach, Cal.	Field (owned), 25 acres; 2 hangars, capacity 11 ships	Both	1 Can. J.N. (OX5) 1 J.N. (OX5) 1 J.N.-4-H. (H.S.) 1 N. 28 (Gn. 160 h.p.) 1 Sp. (Hispano) 1 Polson (OX5)
Dayton Wright Co.	Dayton, Ohio	Field Moraine City, Ohio (main plant), part owned part leased, 100 acres; hangar space in main plant	Complete	1 K.T. (L.) 1 D.W. *Chummy* (LeR. 80 h.p.) 1 D.W. *Chummy* (C1. 120 h.p.) 1 F.P.-No. 2 Seaplane (2 L.)
DeLuxe Air Service, Inc.	Kinmouth Bldg., Asbury Park, N. J.	Field (leased), 30 acres; hangar		3 J.N.-4-C (OX5)
Diggins Aviation Co.	140 No. Dearborn St., Chicago, Ill.	Field (leased), 79th St. and 48th Ave. S. W.; 640 acres; 3 hangars (50 x45)	Good, also barracks and mess hall	3 Can. J.N.-4 1 S.V.A.-9 (L.-6) 1 504-K. (LeR. 110 h.p.) 1 L.S. "*Tourabout*" (W.150 h.p.)
Edgewater Beach Air Service	3158 N. Clark St., Chicago, Ill.	Terminal (Edgewater Beach Hotel), leased; hangar 54x30	Machine shop and mechanic	1 *Seagull* (C.-6 160 h.p.) 1 J.N.-4-D. (OX5, 90 h.p.)
Wm. H. Emery, Jr.	317 W. Corydon, Bradford, Pa.	Field (owned), 30 acres; hangar	Good	1 J.N.-4 (OX5)
Emporia Aviation Co.	Emporia, Kans.	Field (leased), 2 miles west of city, 80 acres; hangar		1 *Swallow* 1 Can. J.N.
F. W. Farris	2049 So. California St., Stockton, Cal.	Field (leased), 64 acres; hangar	Repair facilities for OX5 and J.N.-4	1 J.N.-4 (OX5)
Chas. L. Fower	Macon, Mo.			
K. R. Garver	Attica, Kans.	Field (owned), 4 miles south of town, 40 acres; hangar 40x30	OX5 parts	1 J.N.-4 (OX5) 1 *Swallow* (OX5)
Oliver Gies Airplane Co.	118 Central Ave., Great Falls, Mont.	Field (leased), on west side of city, 75 acres; hangar		1 S.J.-1 (OXX6 110 h.p.) (W.220 h.p.)

NO. I—Continued

Total No. Flights	Average Duration of Flights	Total Mileage	Passengers Carried	Lbs. of Freight	Charge per Short Flight	Charge per lb. of Freight	Charge per Mile Inter-city Flights	Operating Territory
2,500	20 min.	80,000	2,000		$10.00		$ .50	New York, and all cities within radius of 250 miles
1,200	15 min.	25,000	1,500		5.00		.50 2-pass.	Chicago, Fargo, Grand Forks, Duluth
1,000	15 min.	16,000	500		5.00		.50	Chicago, Madison, etc.
2,200	10 min.	25,000	1,578		5.00 to 10.00		.75	Long Beach-Los Angeles Venice, Santa Monica, Ventura, Riverside, Pasadena, Oceanside, San Diego and Santa Ana
1,310	13 min.	22,500	1,500	1,000	No charge promot	. Flight e interest	s made to in aviation	Toledo, Detroit, Cleveland, Buffalo, Toronto, New York, Washington, Indianapolis, Chicago
100	10 min.	5,000	75		5.00		.50	New York and Asbury Park
10,000	4 min. (instruction)	75,000	1,200		10.00		.25	Chicago; all Middlewest
756	15 min.	7,800	1,560		15.00 for 10 min. 2-pass.			Chicago, Evanston, Milwaukee; all points on Lake Michigan
311		5,100	175		10.00		.50	Buffalo-Bradford, Pa.
36	20 min.	1,000	20		5.00		. 50	
225	6 to 40 min.	5,750	123		7.50		.50	Stockton, Fresno, San Francisco, Modesto, Cal.
		7,000	700		5.00		1.00	
5,000		45,000	1,200		5.00		.30	
150 (for 3 mos.)	15 min. to 2 hrs.	4,500	100		5.00		.30	Great Falls, Augusta, Sims, Helena, Butte and Shelby, Mont.

Name of Company	*Address*	*Air Port Facilities*	*Shop and Repair Facilities*	*Equipment*
The Goodyear Tire & Rubber Co.	1144 E. Market St., Akron, Ohio	Wingfoot Lake Avia. Station (owned), 35 acres; hangar 400x100	Repairs at station; machine tools at Akron, 10 miles distant	1 Racing Balloon (80,000 cu. ft.) 3 Spherical Balloons (35,000 cu. ft.)
Carl Gritch	Main St., Withrow, Wash.	Hangar to be built	Withrow, Wash., machine shop	1 S.J. (H.S.), (Mer., 160 h.p.)
Gulf States Flying Circus	Scottsbluff, Neb.			1 S.J.-1 1 S.H.-3 (Bd. 160 h.p.)
James Halstead	105 E. 28th St., New York, N. Y.	Field (leased), Staten Island; hangars	Own repairs	1 H.S.-2-L. (L.) 1 M.F. (Bz.) 1 Can. J.N. (OX)
A. W. Hansen	Rio Vista, Cal.	Field (leased), Church Ranch, 150 acres	Good	1 L.S. (W. 150 h.p.)
Geo. Helwig and Wm. Davenport	Wheaton, Ill.		Good	1 L.W.F. Model G (2 V.-2)
Jack A. Hensel	Wenatchee, Wash.	Field (leased), 30 acres	Fair	1 J.N.-4-D. (OX5) 1 Martin K-6
Cyle Horchem's Aerial Shows	Wichita, Kans.	Field (Laird Airplane Co.) leased, 40 acres		1 S.J.-1 (OX5) 3 *Swallows* (OX5)
Edward Hubbard	56 Roanoke St., Seattle, Wash.	Terminal (leased), Lake Union, Seattle; hangar 50x700	Boeing Airplane Factory	1 B.-1 Flying Boat (L. 400 h.p.) 1 C.L.-4-S. Seaplane (H. S.L. 4)
Huff Daland & Co., Inc.	Ogdensburg, N. Y.	Terminal (leased), 100 acres on St. Lawrence River; hangars at factory	Factory on river front; excellent facilities for land and water machines	4 *Petrels* (OX-5) 1 *Petrel* (W.150 h.p.) 1 TA-2 (OX) 1 TA-2 (Law., 140 h.p.) 1 TA-6 (Law., 200 h.p.) 3 HN-1 (W.E.-2, 180 h.p.) 3 HO-1 (W.E.-3, 200 h.p.)
Huff Daland Aero Corp.	1018 Commerce Bldg. Kansas City, Mo.	Field (owned by Air Terminal Ass'n), Richards Field, 160 acres; 1 army hangar, 1 commercial hangar	Good	1 *Petrel* H.D. 8-C
Lucas and Roy D. Hume	Arkansas City, Kans.	Field (leased by city), 40 acres	Good	2 S.J.-1 (OX5)
Indian Lake Aviation Co.	Russell's Point, Ohio	Field (leased), 40 acres; hangar 60x54	Good, including high test gas at all times	1 J.N.-4-D (OX5) 1 St., 5-pass., (Bd. 190 h.p.) 1 of own design (OX5)
International Aircraft Co.	1003 Scarritt Bldg., Kansas City, Mo.	Richards Field (leased)		
J. L. Aircraft Corp.	347 Madison Ave., New York, N. Y.	Field (leased), Park Ridge, N. J.		6-8 J.L.-6 all-metal Monoplanes Bs. Fighter (S.P.)

NO. I—Continued

Total No. Flights	Average Duration of Flights	Total Mileage	Passengers Carried	Lbs. of Freight	Charge per Short Flight	Charge per lb. of Freight	Charge per Mile Inter-city Flights	Operating Territory
200	12.5 min.	3,000	180	200	$7.50			Wenatchee, Ellensburg, Withrow, Wash.
1,000	25 min.	2,700	1,000	1,000	7.50		$.50	Anywhere
		1,800	500		7.50			Along Atlantic Coast
50	1 hr.	3,600	15		5.00			Rio Vista, Santa Rosa, Sacramento, Marysville
50	15 min.	1,200	240		2.50			Chicago suburbs
75	20 min.	5,000	100		5.00			Spokane, Waterville, Wenatchee
2,000	20 min.	44,000	650		7.50		60c 1 pass. 35c each 2 pass.	Dallas, Houston, San Antonio, Tex., Attica, Ransom, Kans., Kansas City, Mo.
120	7 hr. 10 min.	20,160		60,000 lbs. U. S. mail		.002		Seattle, Wash., and Victoria, B. C., Can.
		10,500			Demonstration flights			
200	15 min.	1,800	100		5.00		.20	Kansas City-Tulsa, Kansas City-Chicago, Kansas City-Omaha, etc.
400	15 min.	6,000	450		5.00		.50	Arkansas City to Tulsa, Okla., Wichita, Kans., Oklahoma City, Okla.
2,100	10 min.	25,000	1,400		5.00		.40	Dayton, Marion, Lima, Columbus, Springfield, Ohio, Ft. Wayne, Ind.
300	½ hr.	65,000	500					

Name of Company	*Address*	*Air Port Facilities*	*Shop and Repair Facilities*	*Equipment*
Johnson Airplane & Supply Co.	R. R. No. 2, Dayton, Ohio	Field (leased), Wilmington Pike and Patterson Rd., 75 acres; 4 hangars, 25,000 sq. ft.	Good	1 Vt. (W. 150 h.p.) 1 S. (Bd. 160 h.p.) 1 F.E.-2-B. (Bd. 160 h.p.) 1 L.V.G. (Benz, 230 h.p.) 6 J.N.-4-D. (OX5 90 h.p.) 1 S. *Scout* (Le.R. 80 h.p.)
R. W. Judson	Detroit, Mich.			1 Lo. A. Y.
W. Wallace Kellett	611 Widener Bldg., Philadelphia, Pa.			Sport F., 2-seaters
Kokomo Aviation Corp.	P. O. Box 77, Kokomo, Ind.	Field (leased), 4 miles south of Court House Sq., 100 acres; hangar 220x45	Complete	18 J.N.-4-D. 2 *Orioles* (C.6)
L.M.C. Drilling Co.	1st Nat'l Bank Bldg., Wichita, Kans.	Laird Field (owned and leased), 40 acres; 3 hangars	Laird Factory	1 *Swallow*
J. K. LaGrone	505 W. 31st St., Kansas City, Mo.	Field (Flying Club of Kansas City), 30 acres; hangar 50x112	Fair	1 L.S.
E. M. Laird Airplane Co.	29th and Hillside Av., Wichita, Kans.	Laird Field (n. e. of city), (owned and leased), 40 acres; 3 hangars 40x50	Complete factory and equipment	*Swallows* *Ld. Cabin Cruiser*
W. L. Lamkin	Porterville, Cal.	Field (owned), 40 acres; hangar 20x50	Good	1 Can. J.N. (OX5)
Harry L. Land	Manatee Ave., Bradentown, Fla.	Field (municipal); hangar		1 J.N.-4 (OX5)
Laurentide Air Service, Ltd.	407 Lake of the Woods Bldg., 10 St. John St., Montreal, Quebec	Fields (leased). (1) Remi Lake, Ont., 4 sq. mi. (2) Lac a la Tortue, Que., 1 sq. mi.	Shop at Remi Lake, 2 at Lac a la Tortue. Complete facilities	3 H.S.-2-L. Flying Boats (L.) 3 J.N.-4-C. (OX5) 1 Lo.A.Y. (L.) 1 504-K. (Le.R. 110 h.p.) 1 *Viking* Amph. (N.L.)
L. W. Leib	Volga, S. D.	Field (leased), 17 acres; hangar	Good	1 S.J.-1 (OX5)
James Levy Aircraft Co.	2035 Indiana Ave., Chicago, Ill.	Field (leased); hangar (leased)		Can. J.N.'s 504-K.'s M.F. Flying Boat (W. 150 h.p.)
Loening Aeronautical Eng. Corp.	31st St. and East River, New York, N. Y.	Terminals (owned), New York City; Newport, R. I.	Loening factory, complete facilities	
The Longren Aircraft Corp.	Cor. Center and Winfield Sts., Topeka, Kans.	Field (leased), 30 acres; hangar 40x50	Longren factory, complete facilities	1 L.H.-2 (OX5) 1 L.A.K.-21 (Law. 3-cyl. 60 h.p.) 3 L.A.K.-22 (An. 6A20) 1 L.A.K.-22 (An. 6A3)
R. W. Mackie	1205 Willard St., Houston, Tex.	Bakers Field (leased), 1 mile west of Houston, 200 acres; tent hangar	Good	2 S.J.-1 (OX5) 1 L.S.-(W. 180 h.p.)

NO. I—Continued

Total No. Flights	Average Duration of Flights	Total Mileage	Passengers Carried	Lbs. of Freight	Charge per Short Flight	Charge per lb. of Freight	Charge per Mile Inter-city Flights	Operating Territory
1,500	15 min.	30,000	1,200		$10.00		$ .50	Central States
		6,000	150		Private use			New York City-Detroit, Montreal
300	10 min.	4,000	125		Demonstration and exhibition			
10,000	15 min.	150,000	2,000	1,000	5.00		.50	Indianapolis, Chicago, Dayton, Detroit, Louisville, Cincinnati
		25,000			For business use only			Kansas, Nebraska, Oklahoma, Texas, Illinois, Michigan, Indiana, Ohio and Wisconsin
175	30 min.	26,250	800	1,000	5.00	30c per mile per 150 lbs.	.40	Lincoln, Omaha, Neb., Joplin, Mo.
	10 min. to 4 hrs.	150,000			7.50		.25	Anywhere
140	15 min.	2,000	112		7.50			Tampa, Bradentown, Sarasota, Arcadia, Fla.
736	1 hr.	60,404	839	12,381	10.00	Varied according to class of work		Montreal, Toronto, Ottawa, Quebec, Canada
225	20 min.	4,500	205		5.00		.25	Sioux Falls, Huron, Dell Rapids, S. D.
300	30 min.	10,000	400		7.50			
16	1 hr.	1,600	128					Port Washington, L. I. and New London, Conn. and Southampton, L. I.
300	15 min. to 2 hrs.	25,000			Test and demonstration flights			Topeka and Kansas City; principal cities in Kansas and Oklahoma
400	20 min.	9,300	200		5.00	1/7c	.20	All cities in So. Texas and Louisiana

Name of Company	*Address*	*Air Port Facilities*	*Shop and Repair Facilities*	*Equipment*
Dave R. Matthews	116 W. Haley St., Santa Barbara, Cal.			1 S.J.-1 (OXX6) 1 J.N.-4-D. (OX5)
Mauldin Aircraft Co., Inc.	Grant Bldg., Fulton, Mo.	Field (leased), 1 mile east of city, 120 acres; hangar 60x90	Shop and parts	1 *Greyhound* (OX5) 2 J.N.-4-D. (OX5)
Maxim Air Service Co.	Winslow, Me.	Field (leased), Benton Ave., 80 acres	Excellent complete equipment	4 Can. J.N. (OX5)
Mayer Aircraft Corp., Inc.	Bridgeville, Pa.			
A. E. Merriam	255 N. Holyoke St., Wichita, Kans.	Field (Laird Airplane Co.) leased, 40 acres	Laird Airplane factory, Wichita, Kans.	1 *Swallow* (OX5)
Michigan Airways, Inc.	223 Delta St., East Lansing, Mich.	Fields (owned), Plainwell, Mich., 80 acres; Merrill (lease), 160 acres; Eaton Rapids (lease), 30 acres	Factory at Lansing	2 S.J.-1 (OX5) 1 S.J.-1 (OXX6) 1 J.N. (OX5)
MidWest Airways Corp.	1125 N. 6th St., Monmouth, Ill.	Checkerboard and Diggins Fields, Chicago, Robinson Field, St. Louis; hangar	Facilities at fields	1 J.N.-4-D 1 Br. (Ren. 300 h.p.) 2 *Orioles* (K.-6)
Mobridge Aerial Co., Inc.	Mobridge, S. D.	Field (leased), 320 acres; hangar	Fair	1 Can. J.N.-4 1 L.S. (W.)
Montana Aero Corp.	Miles City, Mont.	Use Government Reservation, 3,000x4,500, L shape	In town, good	1 S.J.-1 (Mer. 180 h.p.)
Montana Flyers, Inc.	Helena, Mont.	Field (leased), 320 acres; hangar	In town, good	2 J.N.-4-D. (OX5)
Netherlands Aircraft Mfg. Co. (Fokker)	286 Fifth Ave., New York, N. Y.	Field (use Curtiss Field, Mineola, L. I., N. Y.); 1½ hangars, rented, 60 x80	Own personnel for repairs and overhauling	2 Fk. Monoplanes 2 Fk. Biplanes
Jack V. Newland	1101 Franklin St., Waco, Texas	Rich Field, 100 acres; government hangar	Good	1 S.J.-1 (W.150 h.p.)
New York Aircraft Exhibition Corp.	P. O. Box 34, Troy, N. Y.	Field (leased), small	In city, good	1 Can. J.N. (OX5)
Northbird Aviation Co.	Ketchikan, Alaska	Terminal (water); hangar 40x60		1 M.F. Flying Boat
Marvin A. Northrup	300 Builders Exchg., Minneapolis, Minn.	Field (leased); warehouse Robbinsdale; hangar 50 x60	Shop	85 various types
R. A. Northrup	1123 Main St., Great Bend, Kans.	Field (leased) 50 acres; hangar 48x34	Good	1 Can. J.N. (OX5) 1 S.J.-1 (OX5) 1 Curtiss H. (W.)
Northwest Aircraft Co.	Linton, N. D.	Field (leased), 10 acres; hangar 50x30	Garage in town	3 J.N.-4-D. (OX5)

NO. 1—Continued

Total No. Flights	Average Duration of Flights	Total Mileage	Passengers Carried	Lbs. of Freight	Charge per Short Flight	Charge per lb. of Freight	Charge per Mile Inter-city Flights	Operating Territory
1,000	10 min.	10,000	900		$ 5.00			
1,500	20 min.	35,000	1,240		5.00		$ .25	Missouri, Illinois, Iowa, Oklahoma, Kansas and Texas
400	15 min.	6,000	225		10.00			Maine
250	1 hr.	15,000	50		For private business use			Wichita-Purcell, Okla., Higgins, Texas-Oklahoma City
3,000	10 min.	63,000	1,960		5.00		.50	Lansing to Rantoul, Chicago, Ill.; Ft. Wayne, Ind., Hanna, Ind.; all cities in Michigan
300	15 min.	20,000	400		5.00		15c mile, for shipload	Monmouth and Chicago (weekly schedule), anywhere
200	15 min.	3,000	350		5.00			
1,000	12 min.	25,000	1,000		5.00		.25	State of Montana
150	20 min.	30,000	75		7.50		.30	Helena, Missoula, Kalispel and Great Falls, Mont.
339	37 min.	17,000	1,669	2,500				
300	15 to 20 min.	7,000	500		5.00		.25	Central Texas
30	30 min.	900	50		7.50			Vicinity Troy, Albany and Saratoga, N. Y.
200	30 min.	16,000	260	1,000	10.00			Ketchikan, Prince Rupert, Wrangell, Petersburg, Juneau, Skagway, Sitka, etc.
13	30 min.	400			Flights in connection with sales			
400	20 min.	10,000	125		7.50		.15	Hutchinson, Wichita, Kans. and Kansas City, Mo.; intermediate points in Kansas and Oklahoma
300	10 min.	3,000	300		5.00		.30	Bismarck, Aberdeen and Fargo, intermediate towns

Name of Company	*Address*	*Air Port Facilities*	*Shop and Repair Facilities*	*Equipment*
O. O. Beach School of Flying	Old Orchard, Me.	Terminals, Sebago and Moosehead Lakes; field (owned), Old Orchard Beach; metal hangar, 50x50 at Old Orchard Beach		1 S. (OXX6) 1 M.F. Flying Boat (W. 180 h.p.)
Pacific Airways	4239 10th St., Seattle, Wash.	Field Madrona Park (leased), Park Dept.; hangar	Good	1 H.S.-2-L., 7-pass.
Packard Motor Car Co.	E. Grand Blvd. and Belt Line, Detroit, Mich.	Packard Aviation Field, Roseville, Mich. (11½ miles N. E. of Detroit), (leased), 96 acres; 2 hangars, 8,400 sq. ft. floor space	Minor at field. Major repairs and construction at factory, Detroit	1 Pack. 1-A (Pk. 825) 1 Pack. deH (Pk. 1237) 1 Fk. D.-7, 2-pass. (Pk. 825) 1 Fk. D.-7 (Pk. 1237)
N. E. Parks	Main St., Colebrook, N. H.	Field (leased 5 yrs.), 30 acres; hangar 31x16	Machine shop	1 S.J.-1 (K.-6)
T. C. Peterson	411 Orange Ave., Santa Ana, Cal.	Field (leased)		1 N.-9 (OXX6)
The Photomap Co.	43 E. Green St., Pasadena, Cal.	Field (municipal), Glendale		1 S.J.-1 (K.-6) 1 J.N.-4-D. (OX5)
C. O. Prest	Las Vegas, Nev.			1 J.N.-4
Reed-Coats Co.	47-49 Monroe Ave., Grand Rapids, Mich.	Field (leased), end of Madison Ave., 80 acres; 5-ship hangar	Repair shop	2 J.N.-4 (OX5)
Remington-Burnelli Aircraft Corp.	25 W. 45th St., New York, N. Y.	Use Curtiss Field, Mineola, L. I., N. Y. (leased); Hangar No. 1	Good	*R. B. Airliner* (30-pass. biplane), (At. Gal., 550 h.p.)
Rennee Aero Co.	1233 W. 47th St., Oklahoma City, Okla.	Field (rented), south of city; 160 acres; hangar	Complete	4 *Orioles* (C.-6) 2 S.J.-1 (OX5)
Roamer Air Service Co.	Augusta, Me.	Terminal Cobsocounty Lake, Manchester, Me.		1 M.F. Flying Boat (OX-X6)
Robertson Aircraft Corp.	Bridgeton, Mo.	Lambert Field (leased), Bridgeton, Mo., 183 acres; 2 three-ship hangars	Complete	5 S.J.-1, 3-pass. (W. 150 h.p.) 3 J.N.-4-D. (OX5) 1 *Oriole* (W.150 h.p.) 1 Curtiss H. (W. 150 h.p.) 1 St. (I.F. 250 h.p.) 1 S.J.-1 (OX5)
Rowe Fliers (Basil L. Rowe)	Allaben, N. Y.			2 D.H.-6 (OXX6)
Foster Russell Aviation Co.	P. O. Box 27, Spokane, Wash.	Field (leased), 50 acres; 4-ship hangar	Good	1 S.J.-1 (K.-6) 1 S.J.-1 (OX5)
R. W. Schroeder	2276 Logan Blvd., Chicago, Ill.	Ashburn Field (Aero Club of Illinois), 640 acres; 15 hangars, 2 to 5 ship	Good, 3 men	1 S.J.-1 (OX5)
Sheldon Air Line	Sheldon, Ill.	Fields Indianapolis, Ind., Bloomington, Kankakee and Chicago, Ill.; ½x¼ mi., 1x¼, ½x½ and ½x½ respectively; hangar at Chicago	Parts and repairs at Sheldon, Ill.	2 Can. J.N. (OX5) 1 Br. (R.350 h.p.-5-pass.) 1 S.J.-1 (OX5)

NO. I—Continued

Total No. Flights	Average Duration of Flights	Total Mileage	Passengers Carried	Lbs. of Freight	Charge per Short Flight	Charge per lb. of Freight	Charge per Mile Inter-city Flights	Operating Territory
1,200	9 min.	12,000	1,800		$10.00			State of Maine
200	20 min.	6,000	575	1,000	5.00		$60.00 per hour	Seattle, Wash., Puget Sound, Vancouver and Victoria, B. C.
700	30 min.	30,000						
103	20 min.	2,000	50		12.50			Colebrook, Lancaster, Jefferson, etc.
300	25 min.	9,000	250		5.00			Los Angeles-San Diego
500	30 min.	20,000						Local
150	1 hr. 30 min.	7,000	25					U. S., Canada and Alaska
500	30 min.	18,000	200		7.50			Michigan
200	15 min.							
600	3½ to 4 hrs.	3,000	60	1,200	50c mile mile		50c (railroad mile)	St. Louis, Mo., Kansas City, Mo., Dallas, Tex.
500	15 min.	7,000	300		5.00			Lakes, in central Maine
	15 min.	20,000			5.00		Vary	St. Louis, Mo.-Springfield, Ill.; St. Louis-Jefferson City, Mo.
552	13 min.	7,969	656		10.00			New York State, Pennsylvania, Ohio, New Jersey
1,600	15 min.	24,000	800		5.00	.001 ($2.00 per ton mile)	.25	Northwestern U. S.
54	45 min.	2,347	54		Private use			Within a radius of 300 miles of Chicago, Ill.
400	30 min.	38,000	1,500	6,000	5.00	30c	.30	Starting line between Manitowish, Wis., and Chicago daily

Name of Company	*Address*	*Air Port Facilities*	*Shop and Repair Facilities*	*Equipment*
Mac Short	816 E. Iron Ave., Salina, Kans.	Field (leased), 40 acres	Rebuilding of planes and motors	1 Can. J.N. (OX5)
Daisy Smith Aviation Co.	Spokane, Wash.	Field (municipal)		1 J.-1 (C.-6)
"Windy" Smith Fliers	Lawrenceville, Pa.	Field (donated), 40 acres		2 Can. J.N.-(OX5)
Geo. J. Sogge	Irene, S. D.	Field (leased), ½ mile east of town, 60 acres	Good	2 J.N.-4-D (OX5, 90 h.p.) 1 Sop. (C1. 145 h.p.)
Southwest Airplane Co.	306 New Wright Bldg., Tulsa, Okla.	Field (owned), 135 acres; 2 hangars, 90x65 with 20 ft. shop extensions	Complete	Br. *Tourer* (S.P. 240 h.p.) J.N.-6-H. (W. 180 h.p.) J.N.-4-D. (C. 90 h.p.) 2 S. (W. 180 h.p.) 1 S. (C. 90 h.p.)
The Spanish River Pulp & Paper Mills	Sault Ste. Marie, Ont., Canada			
The Lawrence Sperry Aircraft Co., Inc.	Farmingdale, L. I., N. Y.	Field (leased), 500 acres; hangar 100x50	Complete manufacturing facilities	*Messenger* (Law. L.-4) Sperry Monoplane (OX5) 504-K. (LeR. 120 h.p.)
Star Aircraft Co.	750 Iowa St., Dubuque, Iowa			1 J.N.4 (OX5)
Marion Sterling	1101 Franklin St., Waco, Texas	Rich Field (govt.), 100 acres; govt. hangar	Good	1 S.J.-1 (OX5) 1 S.J.-1 (W. 150 h.p.) 1 S. (W. Special)
The Strubler Aero Co.	407 Mining Ex. Bldg., Colorado Springs, Colo.			*Oriole* (C.-6)
H. W. Tennant	715 S. Dakota Ave., Sioux Falls, S. D.	Field (leased), 1 mile n.w. of city, 60 acres	Fair	2 J.N.-4-D. (OX5) 1 S.J.-1 (OX5) 1 Sop. (C1.)
United States Aircraft Corp.	1302 W. Second Ave., Spokane, Wash.	Field (municipal), Parkwater, Wash., 5 miles from Spokane, 700 A.; 2-ship hangar	First class machine shop & parts	1 S.J.-1 (W.) 1 S.J.-1 (L.4) 1 L.S. (W.)
Harold S. Vanderbilt	New York City	Port Washington, L. I.		1 Lo. A.Y.
Varney Aircraft Co.	Peoria, Ill.	Fields (leased), Peoria 45 acres; Delavan, 40 A.; 3-ship hangar	Good	2 J.N.-4 (OX5) 1 A.39-B. Seaplane (OX-X6)
Walter T. Varney	839 Post St., San Francisco, Cal.	Fields (leased) 130 acres; hangar 250x60	Repairs for motors and planes	1 Br. *Tourer* (S.P.) 1 Sal. A2A (Sal. 260 h.p.) 1 V. (W.220 h.p.) 5 J.N.-4-D. (C. or W.) 1 L.S. (W.150 h.p.) 3 V. (W.150 h.p.)
Wallace Bros. Aero Co.	Bettendorf, Iowa	Wallace Field (leased for 5 years), 103¾ acres; 6 hangars	Excellent	J.N.-4-D., S.J.-1 J.N.-4-C., *Oriole* (8 ships owned), (K.-6, OX5, Mer., Bd., Cros)
Westovers Standard Aircraft Co.	2313 1st Ave. N., Billings, Mont.	Ben Hogan Field (3 miles west of Billings), (leased), 100 acres; hangar for 3 ships	Excellent	2 L.S. (W.) 1 J.N.-5

NO. I—Continued

Total No. Flights	Average Duration of Flights	Total Mileage	Passengers Carried	Lbs. of Freight	Charge per Short Flight	Charge per lb. of Freight	Charge per Mile Inter-city Flights	Operating Territory
50	2 hrs.	7,500	25		$ 7.50		$ .50	Salina-Manhattan, Kans., Wichita, Kansas City, Mo., Lincoln, Omaha, Neb.
657	10 min. to 3 hrs.	6,450	1,172		7.50 to 12.50		.50 to 1.00	States of Washington and Montana
700	10 min.	7,000	700		10.00		1.00	States of New York and Pennsylvania
500	20 min.	18,000	300		5.00		25.00 per hour	South Dakota
600	45 min.	41,000	400		10.00 1-pass. 15.00 2-pass.		.03	Cities within a radius of 350 miles of Tulsa, Okla.
400	20 min.	6,000	40					Hempstead and Farmingdale, L. I., N. Y.
400	30 min.	10,000	150		7.50		.25	Cedar Rapids and Dubuque, Iowa
600	20 min.	14,000	1,000	1,500	7.50	1/12c	.25	State of Texas
		1,000						
1,000	15 min.	30,000	800		5.00			South Dakota, North Dakota, Iowa, Minnesota
1,000	40 min.	35,000	500	3,000	5.00	¾c		Spokane-Kalispel, Mont.-Lewiston, Idaho; Wenatchee, Walla Walla, Wash.
		11,000	250		Private use			New York City, Hudson River, Boston, Mass.
1,700	15 min.		630		7.50	¾c	.25	Peoria-Chicago, Peoria-Bloomington
400		60,000	300	3,000 lbs.	10.00	½c per mile	.40	Stockton-Modesto to San Francisco; anywhere
1000	20 min.	27,000	200		5.00		35.00 2-pass. 30.00 1-pass. per hr.	Rock Island, Ill., Peoria, Silvis, Moline, Chicago, Monmouth, Ill.; Davenport, Ia., Des Moines, Iowa City, Dubuque, Omaha and St. Louis
660	15 min. to 1 hr.	17,600	1,000		7.50		.50	State of Wyoming

Name of Company	*Address*	*Air Port Facilities*	*Shop and Repair Facilities*	*Equipment*
White's Aircrafts	17th and Crocker, Des Moines, Ia.	Field (rented), 70 acres	Good	1 Can. J.N. (OX5) 3 J.N.-4-D (OX5) 1 Sport Monoplane
Whitted Air Line	St. Petersburg, Fla.	Field (leased); hangar owned, 50x100	Good	1 Whitted 6-pass. Flying Boat (L.)
Hugh L. Willoughby	Sewall's Point, Fla.	Field (owned), 27 acres; 2 hangars 30x50	Good	1 *Swan* Triplane (OXX6) 1 *Ibis* Biplane (Morse Hispano)
John Perry Wood	Louisa, Ky.	Fields (leased), Randolph, Vt., 20 acres; St. Petersburg, Fla., 10 acres		2 S.J.-1 (W. 150 h.p.)
Wright Aeronautical Corp.	238 Lewis St., Paterson, N. J.	Fields (leased), Port Washington, L. I., N. Y. hangar (leased), Paterson, N. J.	Complete	1 A.-44 Flying Boat (W. E-2) 1 Lo. A.Y. (W.H-3)
Total operators, 129		Total terminals 133, including 107 land, 26 sea, of which 10 were public		650

KEY TO AIRCRAFT AND ENGINE TYPES

Airplanes and Seaplanes

A. ..... Aeromarine Plane & Motor Co., Keyport, N. J.
A.-Navy ..... Aeromarine Plane & Motor Co., Keyport, N. J.
A.-39B. ..... Aeromarine Plane & Motor Co., Keyport, N. J.
A.-40 ..... Aeromarine Plane & Motor Co., Keyport, N. J.
A.-44 ..... Aeromarine Plane & Motor Co., Keyport, N. J.
An. ..... Ansaldo (Italian).
Br. ..... Breguet (French).
Bs. ..... Bristol (British).
B.-1 ..... Boeing Airplane Co., Seattle, Wash.
C.L. ..... Boeing Airplane Co., Seattle, Wash.
C.F. ..... Curtiss Aeroplane & Motor Corp., Garden City, N. Y.
Canadian J.N. ..... Curtiss Aeroplane & Motor Corp., Garden City, N. Y.
D.-Pusher ..... Curtiss Aeroplane & Motor Corp., Garden City, N. Y.
D.H. ..... DeHaviland.
Fm. ..... Farman- W. Wallace Kellett, Philadelphia, Pa.
Fk. ..... Netherlands Aircraft Mfg. Co. (Fokker), New York City.
F.P. ..... Dayton Wright Company, Dayton, O.
H.P. ..... Handley Page (British).
H.S. ..... Navy.
H.S.-1-L. ..... Navy.
H.N.-1 ..... Huff Daland Aero Corp., Ogdensburg, N. Y.
H.O.-1 ..... Huff Daland Aero Corp., Ogdensburg, N. Y.
J.N.-4-D. ..... Curtiss Aeroplane & Motor Corp., Garden City, N. Y.
J.N.-4-H. ..... Curtiss Aeroplane & Motor Corp., Garden City, N. Y.
J.N.-6-H. ..... Curtiss Aeroplane & Motor Corp., Garden City, N. Y.
J.L. ..... J. L. Aircraft Corp., New York City.
K.T. (Dayton Wright Chummy) . Dayton Wright Company, Dayton, O.
LeP. (Lepere) ..... Packard Motor Car Co., Detroit, Mich.
L.S. Tourabout ..... Lincoln Standard; Nebraska Aircraft Corp., Lincoln, Neb.
Lo.A.Y. (Loening Air Yacht).. Loening Aeronautical Engineering Corp., New York City.
L.W.F. ..... L. W. F. Engineering Co., College Point, N. Y.
L.V.G. ..... Johnson Airplane & Supply Co., Dayton, O.
L.H.-2 ..... Longren Aircraft Corp., Topeka, Kan.
L.A.K.-21 ..... Longren Aircraft Corp., Topeka, Kan.
M.F. Flying Boat..... Curtiss Aeroplane & Motor Corp., Garden City, N. Y.
Messenger ..... Lawrence Sperry Aircraft Corp., Farmingdale, N. Y.
N. ..... Nieuport (French).
N.-28 ..... Nieuport (French).
N.-9 ..... Curtiss Aeroplane & Motor Corp., Garden City, N. Y.
Oriole ..... Curtiss Aeroplane & Motor Corp., Garden City, N. Y.
Pack. ..... Packard Motor Car Company, Detroit, Mich.
Petrel ..... Huff Daland Aero Corp., Ogdensburg, N. Y.
Pn. ..... Pioneer.

NO. I—Continued

Total No. Flights	Average Duration of Flights	Total Mileage	Passengers Carried	Lbs. of Freight	Charge per Short Flight	Charge per lb. of Freight	Charge per Mile Inter-city Flights	Operating Territory
357	20 min.	7,500	178	682	$5.00		$ .25	
686	20 min.	20,580	2,058		10.00			Anywhere
50	1 hr.	3,000		5,000 (luggage)				Philadelphia, Atlantic City-New York; Newport; R. I.-Oversea to Block Island
1,500	15 min.	30,000	2,750		7.50		.50	Hanover, N. H., Rutland, Vt.
267	50 min.	15,775	211	6,000	Not operated for pay			Marion, Mass., Newport, R. I., New Rochelle, N. Y., Southampton, L. I., Sachetshead, Conn., Detroit, Mich.
89,936	26-30 min.	2,846,037	75,268	110,663	7.00	.036	.428	

R.B. Airliner ..... Remington-Burnelli Aircraft Corp., New York City.
Seagull ..... Curtiss Aeroplane & Motor Corp., Garden City, N. Y.
S.J.-1 ..... Curtiss Aeroplane & Motor Corp., Garden City, N. Y.
S.H.-4-H. ..... Curtiss Aeroplane & Motor Corp., Garden City, N. Y.
St. ..... Sturtevant Aeroplane Co., Hyde Park, Boston, Mass.
Sal. ..... Salmson (British).
S.V.A. ..... Ansaldo (Italian).
Sp. ..... Spad (French).
Sop. ..... Sopwith (British).
Swallow ..... E. M. Laird Co., Wichita, Kan.
T.A.-2 ..... Huff Daland Aero Corp., Ogdensburg, N. Y.
T.A.-6 ..... Huff Daland Aero Corp., Ogdensburg, N. Y.
Vt. ..... Chance Vought Corp., Long Island City, N. Y.
V. ..... Walter T. Varney, San Francisco, Cal.
Viking Amphibian ..... Vickers, Ltd., W. M. Huskisson, N. Y. C.
504-K. ..... Avro (British).

ENGINES

An. ..... Anzani.
At. Gall. ..... Atlantic Galloway.
Bd. ..... Beardmore.
Bz. ..... Benz.
C. ..... Curtiss.
C-6 ..... Curtiss.
Cl. ..... Clerget.
Gn. ..... Gnome.
H.S. ..... Hall Scott.
H.S. A.-5-A. ..... Hall Scott.
I.F. ..... Isotta Fraschini.
K.-6 ..... Curtiss.
L. ..... Liberty.
Law. ..... Lawrance.
L.-6 ..... Liberty.
LeR. ..... LeRhone.
Mer. ..... Mercedes.
N.L. ..... Napier Lion.
O.X.-5 ..... Curtiss.
OXX3 ..... Curtiss.
OXX6 ..... Curtiss.
Pk. 825 ..... Packard.
Pk. 1237 ..... Packard.
R.R. ..... Rolls Royce.
Ren. ..... Renault.
S.T. ..... Curtiss.
S.H. ..... Curtiss.
S.P. ..... Siddeley Puma.
V-2 ..... Curtiss.
W. ..... Wright.
W.E.-2 ..... Wright.
W.H.-3 ..... Wright.

CHAPTER III

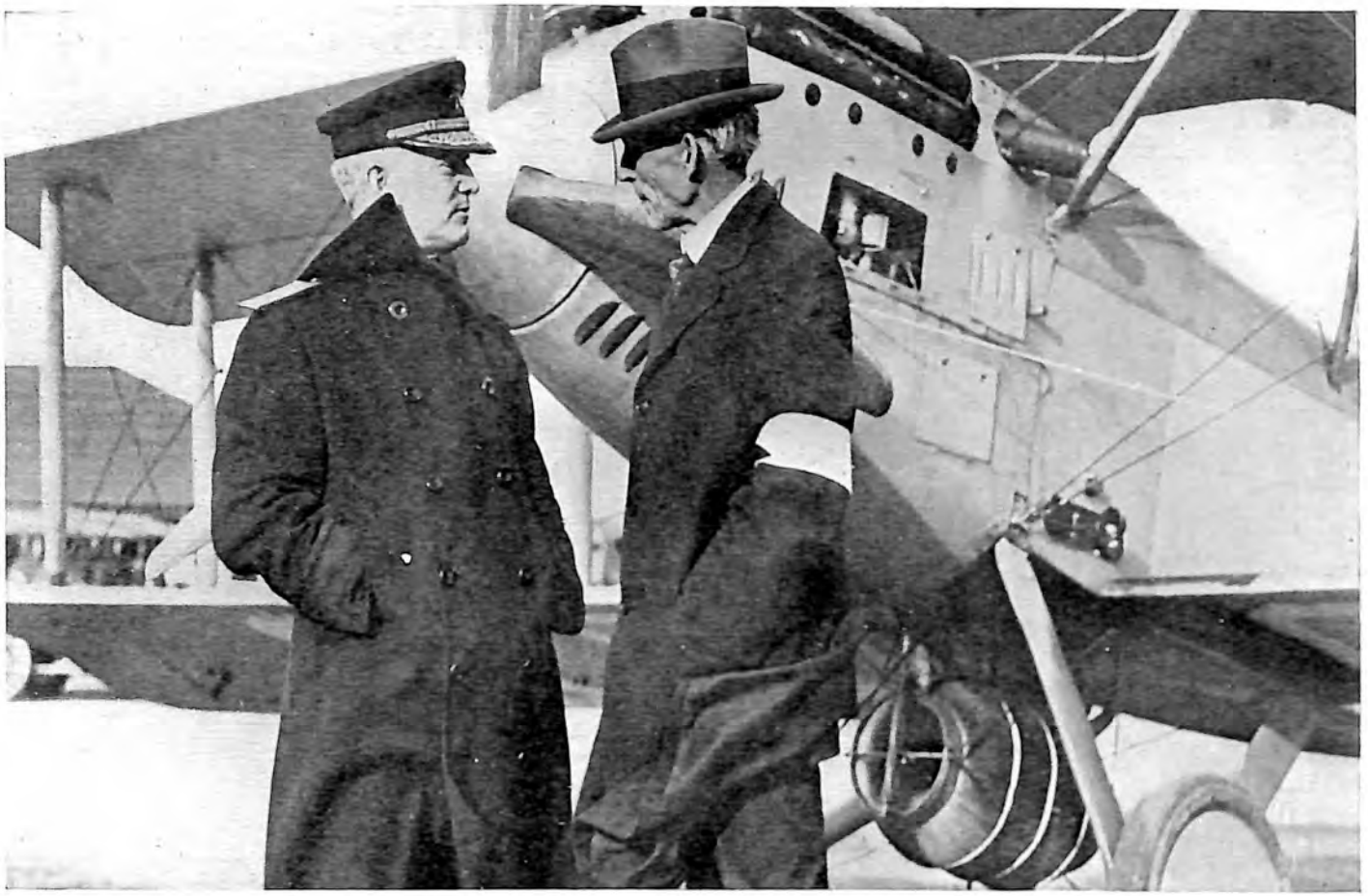
THE NATIONAL AIRPLANE RACES AT DETROIT FOR THE PULITZER AND OTHER TROPHIES—HOW UNITED STATES WON WORLD RECORDS

IN ALL forms of transport, competition in performance, either for efficiency or speed, has been an incentive and a means to progress. The World War, through military necessity, forced an extraordinary development in aeronautics. In time of peace, war-time or service conditions must be simulated if similar development is to be achieved. The passing of the international air classic—the James Gordon Bennett Cup Race—offered a new opportunity for American foresight and generosity which was quickly utilized by the Messrs. Pulitzer, publishers of the New York World and St. Louis Post-Dispatch, to offer the Pulitzer Trophy as a means of further encouraging speed—the outstanding service which aircraft offer.

The first two contests for the Pulitzer Prize, Garden City, 1920, and Omaha, 1921, were interesting mainly as indicating the efforts which American aviation, lacking genuine public support, was making to live up to its birth-right. It was not until 1922 that the consciousness of the country awakened sufficiently to appreciate somewhat the international significance of the air and wherein the United States was lacking. Whereas, European and Asiatic powers, on the close of the World War, for reasons of commercial welfare and national security had set into operation policies deliberately calculated to encourage aviation, the United States, busied with other matters, had neglected to take many of the obvious primary steps.

Brigadier General William Mitchell, Assistant Chief of Air Service, spent the early months of 1922 in intensive study of European conditions. The report which he laid before his Chief, Major General Mason M. Patrick, led to discussions between General Patrick and Rear Admiral William A. Moffett, Chief of the Bureau of Aeronautics, Navy Department, and subsequently to conferences between the Secretaries of War and Navy. As a result it was determined that American manufacturers and designers should be invited to compete in the design and construction of new types of craft.

Major General Mason M. Patrick, Chief, U. S. Air Service; Brigadier General William Mitchell, Assistant Chief of Air Service at Detroit meet.—Official Photo, U. S. Army Air Service.



Rear Admiral W. A. Moffett, Chief, Naval Bureau of Aeronautics, and Henry Ford, at Detroit Meet.—Official Photo, U. S. Navy.

Call for Planes and Engines

The Air Service thereupon requested the Curtiss Aeroplane and Motor Corporation of Garden City, L. I.; Loening Aeronautical Engineering Corporation, New York City; Lawrence Sperry Aircraft Co., Inc., Farmingdale, L. I.; and the Thomas-Morse Aircraft Corporation, Ithaca, N. Y., to lay out pursuit planes. The engineers were permitted a free hand—a privilege thus offered for the first time in the history of the industry—the only restriction, or guidance, being that the planes must be of a design suitable for military work and must have a speed of more than 190 miles an hour, or approximately 30 to 35 miles an hour faster than the most advanced type in use in the air services.

At the same time, the Navy Department authorized Messrs. Booth and Thurston of Hammondsport, N. Y., the Curtiss Aeroplane and Motor Corporation, the Thomas-Morse Aircraft Corporation and the Wright Aeronautical Corporation of Paterson, N. J., to undertake the development of specialized types or the adaptation of existing types, with the predetermined object of attaining speed and maneuverability applicable to duty on ship or shore.

The requirements laid before the engineers were severe. At no time, under peace conditions, had this newest of industries been called upon to conceive, calculate, and construct flying machines of guaranteed performance within a period of four months or so from the time the contracts were signed. But the engineers were not apprehensive. First came their selection of power plant. The Curtiss Company used the D-12 400 h.p. engine of their own design. The Loening and Thomas-Morse Corporations chose the Packard Motor Car Company of Detroit, Mich., which, since its contributions to the Liberty motor, had consistently devoted a portion of its automobile earnings to the development of airplane engines. The Sperry Company, which was charged with the engineering and production of a design by A. R. Verville, an Army Air Service engineer, effected immediate liaison with the Wright Aeronautical Corporation, builders of the Wright engine, the standard power unit for hundreds of service planes called upon for consistent, heavy duty, within average speed ranges, at various flying fields throughout the United States.

Messrs. Booth and Thurston also selected the Wright motor as did the Navy Department itself, whose designers, in close collaboration with the plane and motor engineers of the Wright corporation, created around an entirely new 600 horse power Wright motor a ship of unique design and of impressive subsequent performance.

Necessity for Practical Demonstration

The preliminary construction program having been determined upon, the Services were next required to decide the manner in which this new equipment should be tested. There were two courses. One was to take each machine and fly it separately at Government stations. This method would reveal the main characteristics of performance, though *not* in comparison. Yet comparative performance was desired under conditions approximating those required by military necessity. Thus competition within the service was invited, and, if competition *within* the service, why not friendly competition *between* the respective air arms of the War and Navy Departments? The conclusion was natural, and after careful consideration of all elements, an important one being the opportunity which would thus be presented for satisfying the demand for public demonstration as well as for concentrating the attention of the nation upon aircraft and thereby stimulating national pride and interest, it was formally determined that the machinery of the Pulitzer Contest should be utilized.

Curtiss Marine Flying Trophy Race

In 1911, Glenn H. Curtiss, desiring to provide an annually recurring incentive to endeavor in that line of aeronautics in which he achieved fame as a pioneer—marine flying—set up a handsome trophy to be contested for by seaplanes and flying boats upon a basis of speed and performance. Due to interference by the World War, this race had not yet been flown for a number of years. It was desired, therefore, when arrangements were being made for the Pulitzer competition, to prepare also for the Curtiss Trophy Race.

The Bureau of Aeronautics, Navy Department, turned its attention intensively to the Curtiss Trophy Race and prepared ten seaplanes for entry. To this end, the engineering division of the Navy arranged with the Aeromarine Plane and Motor Company of Keyport, N. J.; Curtiss Aeroplane and Motor Corporation of Garden City, L. I.; Gallaudet Aircraft Corporation, East Greenwich, R. I.; Lawrence Aero-Engine Corporation, New York City; Chance Vought Corporation, Long Island City, N. Y., and the Wright Aeronautical Corporation of Paterson, N. J., for the provision of craft and engines. There was scarcely opportunity, under the Navy's plans, for the development of new designs; nor, indeed, was this thought desirable in consideration of the fact that the Navy already possessed ships either of Curtiss, Gallaudet, Vought or its own design, and in engines, in addi-

tion to the Liberty, had available such motors as the Aeromarine, Curtiss, Lawrance and Wright, some of which were of recognized performance in various ranges of power, and others in the process of evolution.

Selection of a Site

Where the races should be conducted was a matter of serious concern. The same factors which in 1921 had operated favorably upon the entire flying situation, resulted in the substantial beginning of a movement for the creation of a new and truly national civilian aeronautical body which could act as the representative in this country of the international organization controlling contests, records, etc., the Federation Aeronautique Internationale, a task which in the past had been attempted, under difficult circumstances, by the Aero Club of America.

The Contest Committee of the Aero Club was alert to the possibilities and was well informed as to the advantages presented by various localities. In particular was it impressed with the city of Detroit, as represented by the Detroit Aviation Society, the directorate of which embraces such names as the following: H. W. Alden, Charles T. Bush, Howard E. Coffin, Harold H. Emmons, Edsel Ford, W. H. H. Hutton, Jr., Henry B. Joy, Angus McLean, William F. Metzger, E. LeRoy Pelletier, Mason P. Rumney, William E. Scripps, Jesse G. Vincent, Sidney D. Waldon and C. Harold Wills. As President of the Society, Colonel Waldon undertook personal direction of the enterprise. The organization which he formed, functioned effectively as a practical working unit in intimate liaison with the Army and Navy officials.

Support by Public-Spirited Citizens

It would have been impossible for the Detroit Aviation Society to succeed had it not been for the support by the city generally and by many firms and individuals, who contributed toward the underwriting fund, among them being the following:

American State Bank
Autocar Company
Bankers Trust Company
Bank of Detroit
S. L. Bird & Sons Co.
Boyer-Campbell Company
Richard Brand & Co.
Briggs Mfg. Company
Central Savings Bank
Chandler Motor Car Co.
Emory W. Clark
F. G. Clayton Company
Columbia Motors Co.
James Couzens
James Cunningham Sons Co.
Detroit Auto Dealers Assn.
Detroit Florist Club
Detroit Hotel Association
Detroit Insurance Agency
Detroit Motorbus Company

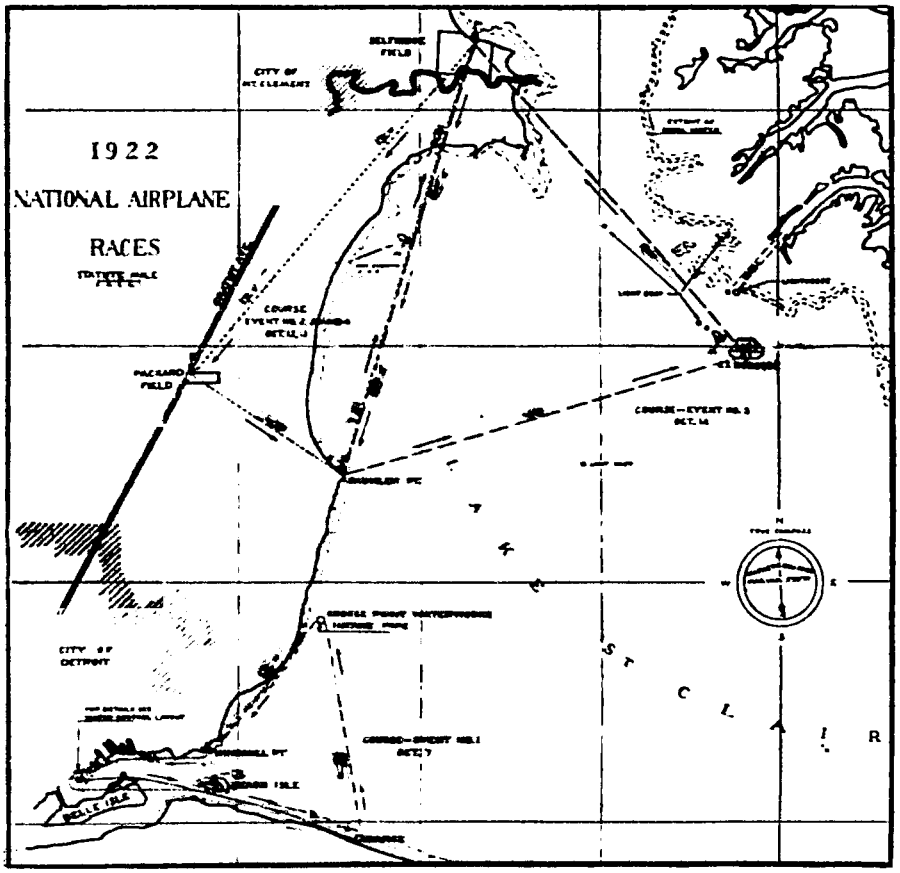
Detroit Music Trades Assn.
Detroit Real Estate Board
Detroit Savings Bank
Detroit Steel Products Co.
Detroit Trust Company
Dime Savings Bank
Dodge Brothers
Electric Autolite Company
First National Bank
Edsel Ford
Gemmer Mfg. Company
General Casualty Company
General Motors Company
E. J. Hickey Company
Holley Carburetor Company
Hudson Motor Car Company
Hupp Motor Car Company
S. S. Kresge Company
Mack Trucks, Inc.
Muzzy-Lyon Company
National Bank of Commerce
Nordyke & Marmon Company
Packard Motor Car Company
Paige-Detroit Motor Car Company
Peerless Motor Car Company
Peoples Outfitting Company
Peoples State Bank
Reo Motor Car Company
Retail Merchants' Bureau (including Dept. Store Group)
Robert Brass Mfg. Company
John R. Russell
Security Trust Company
Standard Oil Company
Splitdorf Electrical Co.
Studebaker Corporation
Clyde J. Taylor (Shoe Dealers Group)
Union Trust Company
United Savings Bank
Wayne County and Home Savings Bank
Zenith Carburetor Company

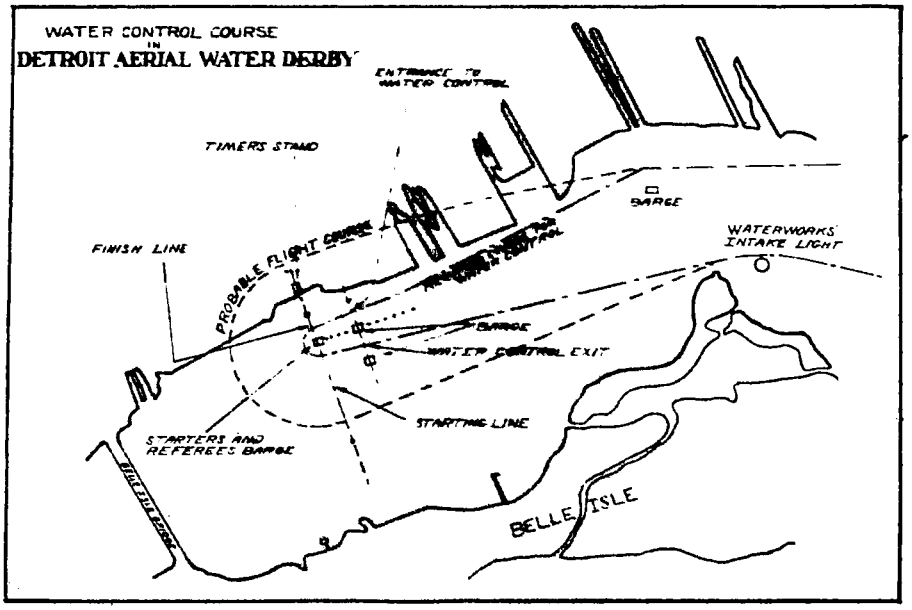
How the Events Were Directed

As will be narrated in Chapter IV, Howard E. Coffin, who during the war was Chairman of the Council of National Defense and for a time Director of Aircraft Production, together with a group of other individuals, had been working for months upon a reorganization of the Aero Club. It was felt that the airplane races should likewise be made the occasion, if possible, for the launching of the new organization. Colonel Waldon, therefore, invited Hugh W. Robertson, Mr. Coffin's personal representative, to work with the Society in arranging for the Second National Aero Congress.

Technicalities, rules, regulations, calculations, inspections, certifications, all the maze of detail attendant upon the practical running of the races, presented a problem which in all likelihood could not have been smoothly and successfully solved had it not been for the assignment, in charge of the second unit of Colonel Waldon's organization, of Russell B. Shaw, representative of the Contest Committee, Aero Club of America.

The third division of activity—the direction of publicity, advertising, program, information, the conduct of liaison between the industry and the Government aviation services on the one hand and between the industry and the Detroit Aviation Society on the other—was assigned to the special representative of the Aeronautical Chamber of Commerce, Howard L. Mingos. Only the confidence which the public press and Government officials alike placed in the Cham-


1922
NATIONAL AIRPLANE
RACES
PACKARD FIELD
CITY OF DETROIT
BELLE ISLE
S T C L A I R


WATER CONTROL COURSE
IN
DETROIT AERIAL WATER DERBY
ENTRANCE TO WATER CONTROL
TIMERS STAND
BARGE
FINISH LINE
PROBABLE FLIGHT COURSE
WATERWORKS INTAKE LIGHT
WATER CONTROL EXIT
STARTING LINE
STARTERS AND REFEREES BARGE
BELLE ISLE

Navy TR-1, Wright engine (Lawrance Type), Lieut. A. W. Gorton, pilot, winner Curtiss Marine Trophy. *Below*—Lieut. L. H. Sanderson, Curtiss Triplane, Curtiss engine, on Water Control, Curtiss Marine Trophy Race.—Official Photos, U. S. Navy.

ber made possible realization of the full value of the events, on behalf of all aviation, official and commercial. The task of the Chamber was difficult in that it was both corrective and constructive. There were indications that the races might be misinterpreted or over emphasized. Likewise, a tremendous impression could be made within the vicinity of Detroit and the most gratifying enthusiasm inspired, yet, if the nation as a whole were not given a clear picture, correctly reported and properly presented, the lasting value would be lost.

Selfridge Field, the Program and the Course

Selection of Detroit was influenced by the location 28 miles from the city of Selfridge Field. The commanding officer, Major Carl Spatz, one of the most competent administrative officers in the Air Service, gave, by direction of the Chief, his full and whole-hearted co-operation to Colonel Waldon and the civilian executives. The Navy Department assigned to Selfridge Field Lieutenant Commander M. A. Mitscher, and the Post Office Department, Carl F. Egge, its General Superintendent. In his liaison with the Navy, the Air Mail and civilians, Major Spatz was assisted by Major Thomas G. Lamphier, in charge of flying, and Lieutenant T. W. Blackburn, in charge of information.

The program of races extended over an entire week, and in the order run, were as follows:

Event No. 1—Curtiss Marine Trophy Race; October 8th; total distance, 160 miles (eight laps of 20 miles). Prizes, $1,200; $600; $200; for fastest flight of laps 2, 3, and 4, $300.

Event No. 2—Detroit News Aerial Mail Trophy; October 12th; total distance, 257.74 miles (ten laps of 25.774 miles). Prizes, $1,200; $600; $200.

Event No. 3—Aviation Country Club of Detroit Trophy; October 13th; total distance, 257.74 miles (ten laps of 25.774 miles). Prizes, $1,200; $600; $200.

Event No. 4—Liberty Engine Builders' Trophy; October 13th; total distance 257.74 miles (ten laps of 25.774 miles). Prizes, $1,200; $600; $200.

Event No. 5—Pulitzer Trophy; October 14th; total distance, 250 kilometers, 155.342 miles (five laps of 50 kilometers, 31.068 miles). Prizes, $1,200; $600; $200.

Event No. 5A—John L. Mitchell trophy; October 14th; total distance, 200 kilometers, 124.274 miles (four laps of 31.068 miles). Prize, $250.

Event No. 6—On to Detroit Race; week of October 8th; distance flown, weight carried, speed, etc. Prizes, $500; $250; $100.

To care for these races, three separate courses were laid out as follows:

For Curtiss Marine Trophy: A generally triangular water course, whose points rested respectively on barges off Belle Isle; at a point off the Canadian shore; and at Grosse Point Waterworks, off the American shore.

For Pulitzer and Mitchell Trophies: A true triangular course, practically all over water, based, respectively, at Selfridge Field, Gaukler Point and the U.S.S. *"Dubuque,"* anchored on Lake St. Clair.

For All Other Events: A triangular course entirely over land, based, respectively, at Selfridge Field, Packard Field and Gaukler Point.

In laying out these courses safety for the pilot and accuracy for record were sought. In making surveys and providing facilities, the Detroit Aviation Society had the assistance of C. F. Ray, of the U. S. Lake Survey, War Department; Commander Richard S. Broadhead, of the U.S.S. *"Dubuque";* Edward L. Woodruff, Superintendent of the Eleventh Lighthouse District; Dr. James W. Inches, Commissioner of Police, Detroit; Edward G. Heckel, Commissioner of Parks and Boulevards, Detroit; Commodore Gar Wood, President of the Yachtmen's Association of America, and Henry Ford.

Of the three courses, that for the Pulitzer race was an original experiment. While the race was exclusively for planes designed to take off from and alight on the land, the course lay over the water, starting and finishing at Selfridge Field. Two legs lay entirely over Lake St. Clair and the third touched only occasionally upon the shore lines. The selection was made, largely for reasons of safety, by a joint board representing the Army and Navy Air Services, consisting of pilots who were to participate. They agreed that, in case of trouble, the fast planes could land more safely in the lake than inland in a thickly settled region.

The Curtiss Marine course, obviously, was entirely over the water.

The third course, being designed for planes with a much slower landing speed than the Pulitzer entries, was conveniently pivoted upon Packard and Selfridge fields and extended entirely over the land.

In the management of the races themselves, the following officials served:

Caleb Bragg, New York, Chairman Contest Committee, Aero Club of America, *Referee.*

Howard Wehrle, Kansas City, *Starter.*

Robert Breese, New York, *Asst. Starter.*

H. H. Knepper, Detroit, and Ode Porter, Indianapolis, *Timers.*

W. A. Brush, W. S. Gilbreath, and F. C. Tollzin, *Asst. Timers.*

W. H. Alden (*Chairman*), C. B. Squier (*Vice-Chairman*).

Ladislas D'Orcy, E. W. Lewis, R. D. Chapin, John Kelsey, F. McGuire, R. D. Bradley, R. S. Ulrich, C. H. Brennan, T. M. Fordon, J. V. Dueweke, and R. L. Messimer, *Judges.*

E. W. Hammond, A. E. Pickard, H. L. Gobell, A. J. Allensworth, William Campbell, and W. E. Cooper, *Scorers.*

Curtiss Marine Trophy Race

This free-for-all contest was for seaplanes and flying boats having an air speed in excess of 70 miles an hour. The entrants started from a standing position on the water at the starting line, from there to fly eight times around the course. The first four laps of free flight were to be followed at the end of the fifth, sixth and seventh laps by alighting on and passing through the water controls located in the Detroit river between Memorial Park and Belle Isle. They then finished by flying across the line at the end of the eighth lap. The pilots were either Naval or Marine aviators. They and their entries were:

Pilot	*Plane*	*No.*	*Color*	*Motor*	*H.P.*	*Entrant*
Capt. F. P. Mulcahy	Vought UO-1	1	Purple	Aeromarine U-873	250	Navy
Lieut. W. K. Patterson	Gallaudet D-4	3	Blue	Liberty HC	420	Navy
1st Lt. L. H. Sanderson	Curtiss 18-T	4	Yellow	Curtiss CD-12	375	Navy
Lieut. R. Irvine	Curtiss 18-T	5	Green	Curtiss CD-12	375	Navy
Lieut. H. A. Elliott	Vought VE-7H	10	Gray	Wright E-3	220	Navy
Lieut. H. J. Brow	Navy TS-2	11	Red	Aeromarine U-8-D	240	Navy
Lieut. S. W. Calloway	Navy TS-1	12	Brown	Wright J-1 (Lawrance type)	220	Navy
Ensign A. J. Williams	Curtiss HA-2	14	Black	Liberty HC	420	Navy
Lt. A. W. Gorton	Navy TR-1	15	White	Wright J-1 (Lawrance type)	220	Navy
Lt. D. Rittenhouse	Navy TR-3	16	Check'd (B&W)	Wright E-3	220	Navy

This being the first marine flying race with military or naval competition, it was not remarkable that results should have been full of disappointments and surprises. Of the ten entries originally listed, one was scratched, one was damaged at the very start and six others completed from three to seven laps. The two that finished were: First, Lieutenant Gorton's Navy designed TR-1, powered with the Wright (Lawrance type) 220 h.p. radial engine, and Second, Lieutenant Elliott's Vought, powered with the Wright E-3, 220 h.p. engine. Gorton's elapsed time was 85 minutes, 13.17 seconds, or at the rate of 112.6 miles an hour. Elliott's elapsed time was 88 minutes, 18.38 seconds, or at the rate of 108.7 miles an hour.

Although the day was raw and the visibility poor, at least 200,000 people, many from outside Detroit, lined the shore for the race. A seaplane in flight is ever a beautiful sight and the color markings of the entries, the barge pennants, the busy surface police craft all combined to make a lively and interesting picture. The performance of the Navy and Vought planes was instructive. Of the two, the Navy, being of later design, was regarded as the faster. Of the engines, the Lawrance was a newly developed type only recently put in production. Its faultless performance, its condition when Gorton stepped from the cockpit to receive congratulations, and possi-

bly more than all its freedom (being air-cooled) from radiation troubles with which other engines were handicapped, turned felicitations likewise to the Lawrence Aero-Engine Corporation.*

The Wright, designed for service work and taken from stock, installed in this instance in a land plane equipped with pontoons, functioned well under trying conditions, its speed per hour being but very slightly less than that of the winner.

Another Vought and a Navy ship plane were powered respectively, with the Aeromarine U-873, 250 h.p., and the Aeromarine U-8-D, 240 h.p., the latter only recently having left the testing rooms of the Aeromarine Plane and Motor Company at Keyport, N. J. Captain Mulcahy in the Vought damaged his ship at the start and thus lost to Aeromarine what otherwise appeared an excellent fighting chance. Lieutenant Brow flew three laps in time which compared well with other contestants and then was forced to withdraw due to loss of radiator water.

The third lap saw the withdrawal of Lieutenant Rittenhouse in the Navy TR, whose Wright E-3 was making nearly 116 miles an hour. A broken propeller forced him down.

In the fifth lap, Lieutenant Galloway, in the Navy TS, Wright (Lawrance type) engine, quit when his oil pressure fell, and Lieutenant Patterson in the Gallaudet D-4, Liberty engine, and Lieutenant Irvine in the Curtiss 18-T, Curtiss engine, were eliminated. Both the Gallaudet and the Curtiss came down through sheer misfortune. The Gallaudet for five laps had been a consistent contender for a place in the race, when, on making one of the required landings at the water control, the propeller struck floating debris and was shattered. A similar mishap—debris in the water control—damaged the Curtiss wing pontoon and forced it to withdraw.

But the hardest experience of all was undoubtedly that of Lieutenant Sanderson in the Curtiss 18-T, No. 4. This craft was built by Curtiss in 1918 as a battleplane. Powered with a Curtiss engine, it appeared beyond all question to be the winner, as the rate of speed at which each lap was traversed was considerably in excess of that of the winner. When, near the close of the last lap, Sanderson came to rest within a mile and a half of the finish line, there was general consternation and regret, all the more marked when it became known that the gasoline supply was exhausted. Sanderson's fastest time was in the fourth lap, when he made 125.3 miles an hour.

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*The Laurance Aero-Engine Corp. was subsequently acquired by the Wright Aeronautical Corp.

Glenn L. Martin Bomber, two Liberties, turning Pylon, Aerial Male Race. *Below*—Lieut. T. J. Koenig and Packard-Lepere, Liberty engine, winner Liberty Engine Builders Trophy.—Photo, U. S. Army Air Service.

C. S. Jones and Curtiss "*Oriole*," Curtiss engine, second in On-To-Detroit Race. *Below*—Lieut. D. F. Stace, in Thomas-Morse, Wright engine, winner John L. Mitchell Trophy.—Photo, U. S. Army Air Service.

Rear Admiral Moffett was quick to appraise the lasting benefits resulting from the race. In an interview he said:

"The Curtiss Marine Trophy Race was a peace-time illustration of what would occur were the nation to be attacked without warning and were the Navy called upon to defend our coasts with its present insufficient equipment. It reveals clearly the need for scientific development and expansion of the Naval Air Force. We learned more from this contest of value in construction of material and training of personnel for duty under conditions approximating those of war than we could have learned in a year of ordinary operations. It shows the need for concentration of our effort in the Navy on the complete and thorough development of its Air Arm. The expenditure for this demonstration means the actual saving of millions of dollars that would otherwise have been spent over a long period of theoretical experimentation."

Detroit News Aerial Mail Trophy Race

The Detroit News, through William E. Scripps, himself a pilot, had for years carried out a definite, constructive policy pointing the way for American growth in aviation. The Aerial Mail being to many the type of service which aircraft can most easily render, it was natural, therefore, that Mr. Scripps should have set up, on behalf of the Detroit News, a trophy calculated further to inspire performance in the postal service. Unfortunately, however, when the conditions of competition were prepared, the contest was limited to multi-motored planes carrying pay loads of 800 pounds or more, none of which at present is in the Aerial Mail. Although the Post Office Department had twelve cargo-carrying ships on the field, not one could participate, to the keen disappointment of the pilots and regret of officials and spectators.

All the five entries were U. S. Air Service Martins,* built by the Glenn L. Martin Company, Cleveland, O. Four were bombers and the fifth was a transport. Each was powered with two Liberties. They were:

Pilot	*Plane*	*No.*	*Motor*	*H.P.*	*Entrant*
Capt. W. R. Lawson	Martin Bomber	22	2-Liberty-12	400	U. S. Army
Lieut. C. M. Cummings	Martin Bomber	23	2-Liberty-12	400	U. S. Army
Lieut. C. B. Austin	Martin Bomber	24	2-Liberty-12	400	U. S. Army
Lieut. Phil. Melville	Martin Bomber	25	2-Liberty-12	400	U. S. Army
Lieut. E. H. Nelson	Martin Transport	26	2-Liberty-12	400	U. S. Army

As the planes possessed the same characteristics and possibilities, the race was really a test of piloting, allowing for the transport being ordinarily six miles faster than the bombers. Lieutenant Nelson in his transport maintained his natural advantage of speed until the finish. He averaged for the ten laps a total distance of 257.7 miles, a speed of 105.1 miles an hour. Lieutenant Austin, pilot-

* For official results see Appendix.

ing No. 24, finished second at an average speed of 101.4 miles an hour. Cummings was third at 101 flat.

The Martin bombers were the same type, and, in certain instances, the same machines, which in 1921 flew from Langley Field, 100 miles to see off the Virginia Capes, sunk the ex-German warships with aerial bombs, and returned safely to their base. The characteristic of these Martins, then, as in the Detroit race, was their dependability and their consistent performance up to the Martin standard.

Aviation Country Club Trophy Race

Detroit has another claim to unique distinction in aeronautics in that it was the first city to appreciate, tangibly, the value of combining aviation with the accepted features of a country club. This organization contributed a trophy for airplanes arranged to seat three or more passengers, including pilot, and having an air speed greater than 80 miles an hour.*

Only four planes entered, as follows:

Pilot	*Plane*	*No.*	*Motor*	*H.P.*	*Entrant*
Lt. R. S. Worthington	Army T-2 (Fokker)	27	Liberty 12	400	U. S. Army
James M. Johnson	Vought VE-7	29	Hispano Suiza	200	Johnson Supply Co.
C. S. Jones	Curtiss Oriole	30	Curtiss C-6	160	Curtiss Exhib. Co.
Lieut. H. R. Harris	Honeymoon Express	32	Liberty 12	400	U. S. Army

Participation by these ships bore results not difficult to foresee. A speed contest between a light commercial carrier, such as the Curtiss *"Oriole"*; a heavy weight lifter, like the Fokker transport; a training type, the Vought three-seater; and, finally, the very fast and powerful *"Honeymoon Express,"* was curious, if not bizarre, and the conviction was generally expressed that very unfair handicaps were imposed. The race was won by Lieutenant Harris in the *"Honeymoon Express."* A striking feature was the tying, for second and third place, of Charles S. Jones in the Curtiss *"Oriole"* and Lieutenant Worthington in the Fokker. The *"Oriole"* has a Curtiss C-6 engine of only 160 h.p.; the Army Fokker has a 400 h.p. Liberty. Mr. Jones, who is flying manager for the Curtiss Aeroplane and Motor Corporation, had previously piloted his *"Oriole"* to Detroit from New York. Mr. Johnson, of the Johnson Airplane and Supply Company, Dayton, O., who had also flown his Vought to the races, had hard luck when accessories became fouled.

Liberty Engine Builders' Trophy Race

Over the same course, on October 13th, nine Army Air Service planes contended for the Liberty Engine Builders' Trophy for light

* For official results see Appendix.

observation, two-passenger craft.* All entries were standard Air Service types. They were:

Pilot	*Plane*	*No.*	*Motor*	*H.P.*	*Entrant*
Lieut. B. R. Morton	DeHaviland 4-B-Observa.	33	Liberty-12	400	U. S. Army
Lieut. J. D. Givens	DeHaviland 4-B-Observa.	34	Liberty-12	400	U. S. Army
Lieut. W. R. Carter	DeHaviland 4-B-Observa.	35	Liberty-12	400	U. S. Army
Major F. Bradley	DeHaviland 4-B-Observa.	36	Liberty-12	400	U. S. Army
Lieut. W. L. Boyd	DeHaviland 4-B-Observa.	37	Liberty-12	400	U. S. Army
Capt. L. L. Harvey	XB-1-A Observation	38	Wright H-2	300	U. S. Army
Lieut. T. J. Koenig	Lepere Observation	39	Liberty-12	400	U. S. Army
Lieut. D. V. Gaffney	XB-1-A Observation	41	Wright H-2	300	U. S. Army
Lieut. G. W. Goddard	DH-4-B-P	59	Liberty-12	400	U. S. Army

The rated speed of the DeHaviland 4-B, is 124 miles an hour; that of the Lapere, 133 miles an hour, and the XB-1-A, 130 miles with which the Lepere was equipped. Several of the DeHavilands and the XB-1-A is an Air Service design; both constructed by the Dayton Wright Co., Dayton, O. The Lepere is the war type resulting from development work at the Packard Motor Car Company, carried on simultaneously with production of the Liberty motor, with which the Lepere was equipped. Several of the DeHavilands made desperate attempts to beat Lieutenant Koenig in the Lepere, but Koenig won at an average speed of 128.8 miles an hour. Major Bradley was second in a DH-4-B, at an average speed of 126.4 miles an hour, and Lieutenant Boyd, also in a DH-4-B, was third, at an average speed of 121.9 miles an hour. Boyd's plane after the race was disqualified due to streamline covering over the rear cockpit and failure to carry the required load. The XB-1-A's failed to finish. These planes are experimental design, still in process of development.

John L. Mitchell Trophy Race

Brigadier General Mitchell offered an intra-service trophy in memory to his brother, John L. Mitchell, also an aviator, who lost his life in France. This trophy in some ways meant more to the pilots within the Air Service than others of the awards; it typified unselfish sacrifice and symbolized *esprit de corps* devotion to duty and sustained endeavor to contribute to the limit of ability.

On July 1st, the First Pursuit Group, under the command of Major Spatz, had been ordered from Kelly Field, Texas, to Selfridge Field. The Group transported itself. The entire distance of nearly 1,500 miles was flown in the standard equipment—the Thomas-Morse MB-3 pursuit plane, equipped with the Wright H-2 300 h.p. engine. The MB-3 was the first pursuit plane to be developed by American engineers subsequent to the Armistice. Built for short-distance flights at great speed, the long cross-country journey from Kelly

* For official results see Appendix.

Field, without delay or the slightest injury to equipment and personnel, was in itself a remarkable achievement for craft and motor.

At Selfridge Field, during the intermissions incident to preparing for the various races, much of the burden of sustaining interest in the impatient throng of spectators fell upon the First Pursuit Group. The ships were daily on the line and many were in the air for hours. While final details incident to the Pulitzer Race were being arranged, the John L. Mitchell Trophy contest was flown.* The following were entered:

Pilot	*Plane*	*No.*	*Engine*	*H.P.*
Capt. A. M. Guidera	Thomas-Morse MB-3	51	Wright H-2	300
Lieut. B. K. McBride	Thomas-Morse MB-3	52	Wright H-2	300
Capt. H. M. Elmendorf	Thomas-Morse MB-3	53	Wright H-2	300
Lieut. D. F. Stace	Thomas-Morse MB-3	54	Wright H-2	300
Capt. O. W. Broberg	Thomas-Morse MB-3	55	Wright H-2	300
Lieut. J. B. Summers	Thomas-Morse MB-3	56	Wright H-2	300

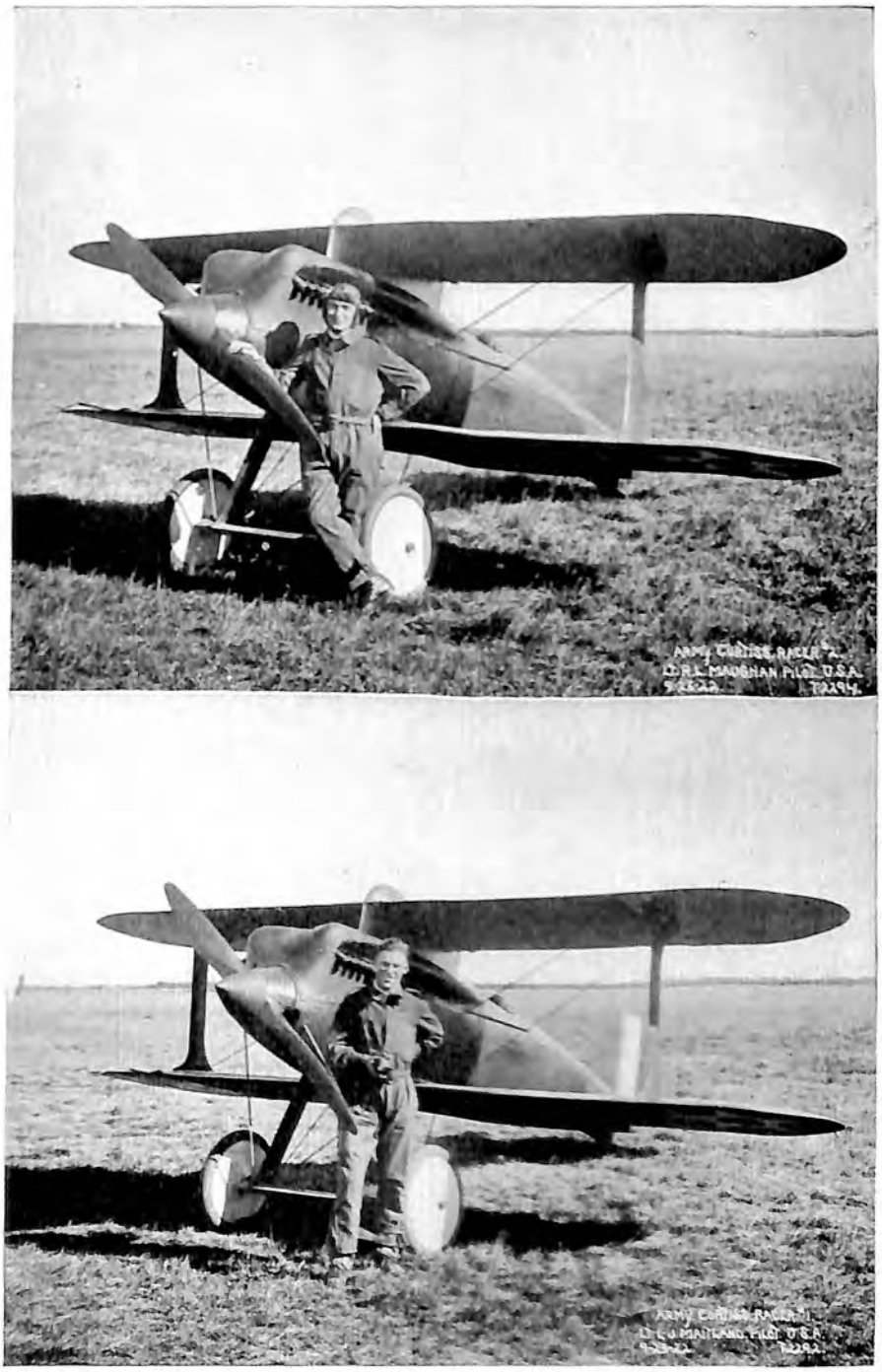
The six machines took off practically at the same moment, circled the field and sped away. It was an inspiring sight. With one exception, when Lieut. Summers came down through radiation difficulty, the contestants, starting together, kept together, and finished very close together—an indication, aside from the sheer sport of it, of the functioning to standard performance of the Wright engine and Thomas-Morse plane, whose conjoining, in the MB-3, led to the adoption in 1921 of this type as the service pursuit equipment of the Army Air Service.

Lieutenant Stace, in No. 54, won, at an average speed of 147.8 miles an hour; Captain Guidera, in No. 51, was second at 136 miles an hour, and Captain Broberg third, at 135 miles an hour.

On to Detroit Race

A feature of the events calculated to be of wide-spread influence in the stimulation of civilian flying was the On to Detroit Race. The contestants were those pilots who flew machines from home fields to Detroit for the races. The winners were chosen according to points obtained by a formula based on elapsed time, miles flown, average speed and motor power.* Walter H. Beach, of the E. M. Laird Company, Wichita, Kans., took first prize in a Laird *"Swallow,"* with Curtiss OX-5 motor. Charles S. Jones, of the Curtiss Aeroplane and Motor Corporation, was second in his Curtiss *"Oriole,"* with Curtiss C-6 engine. Eddie Stinson was third in a German all-metal monoplane of Junkers type, with B.M.W. motor. Beach had

* For official results see Appendix.



Pulitzer Race. *Below*—Lieut. L. J. Mailland and Army Curtiss Racer, Lieut. R. L. Maughan and Army Curtiss Racer, Curtiss engine, first in Curtiss engine, second in Pulitzer Race.

Lieut. H. J. Brow, Navy Curtiss Racer, Curtiss engine, third in Pulitzer Race. Below—Ensign A. J. Williams, Navy Curtiss Racer, Curtiss engine, fourth in Pulitzer Race.

flown from Wichita, Jones from Buffalo and Stinson from Chicago. Other entrants included S. S. Moore, in his Canadian Curtiss, from Toronto; Shirley Short, in a Breguet from Monmouth, Ill.; B. H. Pearson, in a Curtiss *"Oriole"* from Garden City, L. I., and J. M. Johnson, in a Vought VE-7 from Dayton, O.

Pulitzer Trophy Race

In order fully to interpret the far-reaching consequences of the Pulitzer Race,* cognizance should be taken of the factors lending an international significance to this event, which otherwise might have been simply an interesting mechanical demonstration.

It is an axiom, recognized by every leading nation in the world, that the basis of Air Power is a sound aircraft industry, largely independent of patronage by the Government, serving primarily the peaceful, commercial needs of the country, yet existing and functioning as a reservoir in production facilities and primary trained personnel from which the Army and Navy can draw in time of need.

That which navigates the air dominates both land and sea; and within the air itself, that which has the greatest speed and maneuverability is the controlling factor. Thus, first and last, in war and peace, speed and maneuverability constitute the primary service which aircraft have to offer. The Messrs. Ralph, Joseph and Herbert Pulitzer, realizing this, conceived and donated the Pulitzer Trophy and the race for this trophy has now become the air speed classic of the world.

The rules for the 1922 race required that no plane, having an air speed less than 140 miles an hour, or a landing speed more than 75 miles an hour, could compete, thereby ruling out the mediocre craft on the one hand and barring the freaks, those with fairly high air speed but dangerous and impossible landing speed.

Rivalry a Means to an End

When it was finally determined by the Air Service to enter the Pulitzer race, the primary thought was not competition for speed as such, but rivalry, first among the designers and manufacturers, and second among the mechanicians and pilots, as a quick means to a very necessary end. This end, of itself, was the summoning to the command of the Air Service all the resourcefulness, all the originality, ingenuity and pluck latent in civilian and service men. World records were desirable, coveted, but they were an incident in the broad Air Service policy. If new world records could be established, splendid; if not, there would first of all be the stimulated

* For official results see Appendix.

progress in designing and testing, and second, the lessons to be learned as *what not to do* as well as *what to do*.

Instructions given by the Air Service to the Curtiss Aeroplane and Motor Corporation; the Loening Aeronautical Engineering Corporation; Lawrence Sperry Aircraft Co., Inc., and the Thomas-Morse Aircraft Corporation were to produce a craft with a minimum speed of 190 miles an hour. No pre-conceived service ideas were laid before them; they had the freest opportunity to follow their own line of thought, but they were required to design a ship having the necessary strength characteristics whose minimum speed would be nearly *twenty miles an hour greater* than the *fastest* speed registered at the Pulitzer Race in 1921.

In the engine field the difficulties were more complex. A successful airplane engine can not be evolved as quickly as the plane itself. Aside from a few pioneer efforts, such as the original motor of Wilbur and Orville Wright, the Curtiss, etc., intensive airplane power plant development dates only from the World War, or later.

The Curtiss Company, by reason of its early-established and continuous activity in aeronautical work, possessed the advantage of having had under development at its own expense for some years a steadily progressive refinement of a high-speed engine. At the same time it alone of all the competing firms was engaged throughout this long period, in the simultaneous progressive refinement of complete aircraft. When invited to contribute to the Pulitzer entries, the Curtiss Company, therefore, adopted the conservative policy of cleaning up a proved and accepted orthodox design of biplane, and installed the 400 h.p. Curtiss pursuit engine.

Neither the Packard Motor Car Company nor the Wright Aeronautical Corporation up to that time had been in plane production for any considerable period, and then only during the stress of war. The requirements of both of the services since the Armistice (in line with tendencies abroad) had been greater horse-power in single units. Thus both Wright and Packard had in their laboratories examples of 600 horse-power engines which were greatly desired by the Army and Navy for use in planes which other designers were creating. In addition, the Wright corporation supplied motors of 350 and 400 horse-power to yet other plane designers. Around these engines, to which the ideas of the designer had to be arbitrarily fitted, were constructed the aircraft.

A discussion of the technical features of the entries in the Pulitzer Race will be found in Chapter X. In general, their characteristics were not visibly very different from types hitherto tried out; there were no radical departures from proved standards

of aeronautical engineering; and there were no freak conceptions. Stronger, lighter construction, elimination of vibration and parasite resistance; infinite refinement in detail, much of it unseen to the casual spectator, and vastly increased knowledge as to the working and utilization of new metals or other materials were features to be found in every entry. Of the fifteen planes contesting, nine were monoplanes, five were biplanes and one a sesquiplane, or biplane with the lower wing greatly clipped. Thirteen were constructed of wood and fabric and two entirely of duralumin or steel alloys. Five had retractable landing gear. Probably the most striking and unique departure was the Curtiss wing-radiator, a new development.

Public Interest in the Race

The belief expressed by the War and Navy Departments that it was a matter of duty to permit the public at large to witness the demonstration of speed and trial of new equipment, was fully justified by the interest manifested throughout the country in the National Airplane Races. In fact, it was the Pulitzer Race, rather than the commercial addresses of the Air Institute, or the public policy discussions at the meetings of the Aero Congress, with which the people were concerned. Competition, speed, a week of intense activity, the possibility of continued thrills—these attracted many thousands of people to Detroit and prompted newspapers in every state to satisfy the interest of their readers by featuring as first page news each item of flying activity recorded during the races.

It was truly a national event and the City of Detroit, under the vigorous leadership of the Detroit Aviation Society and guidance of the special executives attached to the organization, rose to the occasion. The city and all its suburbs were brightly decorated. The graceful outline of the Pulitzer Trophy became the motif in all advertising. Flags, bunting, banners, painted signs, posters, window and car cards all bore this Herald of Speed. "Two Hundred Miles an Hour" was the daring promise given the public weeks in advance—two hundred miles an hour assured to a community which, in its experience with track and road motor car racing, believed that it had already seen the ultimate in speed!

The events were well-advertised. Railway and steamer lines entering Detroit arranged for special service and in numbers of instances special trains were chartered by delegations from distant points. As has been stated, some two hundred visiting planes were flown in and housed at Selfridge Field, while literally thousands of motor cars provided transportation from many states.

Streets and highways leading from Detroit and through Mt.

Clemens to Selfridge Field were hung with banners. From the roofs of lofty office buildings floated three great captive balloons donated by the Goodyear Tire & Rubber Company each bearing in huge letters announcement of the events. These spheres served the dual purpose of advertisement and guide to visiting fliers. The gate of the field itself took on the character of an exposition ground entrance. The officers of the Army and Navy and executives of the Air Mail taking all responsibility for field management and control, the reception and care of spectators, the timing, reporting and the thousand other details attendant upon the occasion were left to the officials of the Detroit Aviation Society, the Aero Club of America and the Aeronautical Chamber of Commerce.

To one side of the field, within full view of both the Selfridge pylon, round which the fliers whirled, and the judge and press boxes, yet distant enough to assure absolute safety, was erected a grand stand with a seating capacity of 5,500. Several huge score boards, to which the electrically timed returns were dispatched, kept the spectators informed. Bands from the various motor car plants and from the Cass Technical High School enlivened the intervals. At one end of the grand stand a radio receiving station, with amplifier, had been erected by the Wright Aeronautical Corporation, in collaboration with the General Electric Company. The Wright Corporation sent its flying boat, the *"Wilbur Wright"* from New York to Detroit, equipped with transmitting radio and carrying newspaper correspondents and others as guests. The *"Wilbur Wright"* keeping well out of the way over Lake St. Clair, and often out of sight of the spectators, provided information and diversion by transmitting news to the thousands of spectators or by reporting the races from the unique vantage point of the clouds.

Another feature, not only of this day, but of the week, was the transport service, via flying boat, maintained on schedule between Detroit and the pier at Selfridge Field by Aeromarine Airways, Inc. All summer Aeromarine had been operating across Lake Erie, between Detroit and Cleveland, and for the special service of the races had concentrated in Detroit, three flying boats which were utilized regularly by the officials and the press.

Spectators Tense with Excitement

When the hour finally came for the Pulitzer Race to start, the weather had cleared into a brilliant and temperate autumn day. It is estimated that 30,000 spectators were in and around Selfridge Field and all were tense with excitement.

Bert Acosta, flying a Navy-Curtiss plane in the 1921 Pulitzer Race, had set a then world record for a closed circuit of 176.7 miles an hour. But this mark, in the months following, was beaten both in England and France. Hence here was a challenge to American sportmanship. The planes and engines were ready; the weather was ideal; the course was surveyed, marked with pylons, guarded, safe; the pilots were eager to start. As a last precaution against possible crowding at the hairpin turns around the pylons, the officials, instead of permitting the entire field to take off in quick succession, grouped the entries into three classes, but nothing was lost in interest or excitement.

The following pilots and machines started:

Pilot	*Plane*	*No.*	*Motor*	*H.P.*	*Entrant*
Capt. E. P. Mulcahy	MB-7 (Thomas-Morse)	7	Wright H-3	400	Navy
A. J. Williams, Jr.	CR-1 (Curtiss)	8	Curtiss CD-12	400	Navy
L. H. Sanderson	Navy—Wright	9	Wright	600	Navy
Lt. S. W. Calloway	BR-1 (Bee Line)	18	Wright H-3	400	Navy
Lt. H. B. Brow	CR-2 (Curtiss)	40	Curtiss CD-12	400	Navy
Lt. C. C. Moseley	Verville VCP-1 (Packard)	42	Packard	600	Army
Lt. R. L. Maughan	Curtiss High Speed Pursuit	43	Curtiss D-12	400	Army
Lt. L. J. Maitland	Curtiss High Speed Pursuit	44	Curtiss D-12	400	Army
Lt. E. C. Whitehead	Loening High Speed Pursuit	46	Packard	600	Army
Lt. L. D. Schulze	Loening High Speed Pursuit	45	Packard	600	Army
Capt. F. O. D. Hunter	Thomas Morse High Speed Pursuit	47	Packard	600	Army
Lt. C. L. Bissell	Thomas Morse High Speed Pursuit	48	Packard	600	Army
Lt. E. H. Barksdale	Verville Sperry High Speed Pursuit	49	Wright H-2	350	Army
Capt. St. Clair Streett	Verville Sperry High Speed Pursuit	50	Wright H-2	350	Army
Lt. F. B. Johnson	Sperry High Speed	58	Wright H-2	350	Army

Under the rules each contestant was to receive a signal to start after he himself had first signalled that he was ready. The time for each lap was to be taken after he had flown across the starting line, which also served to close each lap. By the score boards and amplifiers, the spectators were able to identify each plane, to know when each started and to visualize it on its course.

The starting, timing and control mechanism functioned smoothly. One after the other, in quick succession, the pursuit planes took the air, found their altitude and direction, gave the ready signal and roared past the official stand. Though there was no special attempt to add to the gaiety by painting the machines, it so worked out that the colors utilized by the manufacturers, played upon by the brilliant sun, gave the spectators the impression of a flying ribbon each time a contestant flashed by. There were, of course, the service khaki and grays of the Army and Navy, splashed and banded with the nation's heraldric colors, red, white and blue and the flying stars; there were ebony black, silver, green, gold and copper and the startling gleam of burnished metal wings and body.

Curtiss First, Second, Third and Fourth

In describing the race in detail it is well to recall again the fundamental reasons which impelled the Government services to participate:

First—The stimulation of engineering and design.

Second—Trials as between the Army and Navy.

Third—Intensive training of pilots in handling fast equipment.

Fourth—An opportunity for the public to witness progress in aviation and, through appreciation, thereby assist in the development of American aeronautics.

The first objective had been achieved before the race was flown. The response made by the plane and engine companies, within their respective fields, was gratifying and inspection of the entries while under construction and later while being demonstrated on the field, convinced General Patrick and Admiral Moffett that the effort had been far more successful than they had even hoped, particularly in detail and refinement.

Competition and training were inseparable and while there were many occasions where friction might have seemed likely, the national purpose of the demonstrations was so clearly understood that, rivals though they were personally, the pilots of the Army, Navy and Marine Corps entered the race, each hopeful of winning, but, lacking victory, desirous of getting the most out of the plane that had been assigned to him, registering its good points or noting opportunities for improvement.

Representatives of the great newspapers in New York, Chicago, Boston, Omaha, St. Louis, etc., were present and wired home colorful descriptions of the races which were handled in full by the Associated Press, United Press, International News and other similar services. Thus the "crowd" was expanded to wherever newspapers are read.

Among the pilots, the Curtiss-Army entries were the favorites from the very first. The clean, simple biplane design, compact engine, dainty streamlined body exquisitely finished, made a deep impression. Those who witnessed the race can never forget the magnificent sight which the Army-Curtiss Racers presented as they sped by, a flash of black and silver, with fast-turning propeller seen only as a golden disc. In rounding the Selfridge Field pylon, both Lieutenants Maughan and Maitland at times so skillfully maneuvered their craft that the planes were once or twice actually beyond the vertical, or flying upside down, only to be returned to even keel in a few seconds, without loss of speed, dip and pass the judges in regular position.

From the moment the first entry took off till the last alighted, there was not a lull. With such tremendous speeds there were only brief intervals between the disappearance of a contestant down the shore and his reappearance out of the haze of Lake St. Clair.

The clock-like regularity with which the Curtiss-Army and Navy Racers sped past each successive pylon, and the phenomenal speeds registered prepared the spectators for the result. First, second, third and fourth places were taken by Curtiss as follows:

Position	*Airplane*	*Pilot*	*Entrant*	*No.*	*Total Elapsed Time* Min. Sec.	*Speed (MPH)*
First	Curtiss High Speed Pursuit	R. L. Maughan, Lt.U.S.A.	U.S.A.S.	43	904.45	205.8
Second	Curtiss High Speed Pursuit	L. J. Maitland, Lt.U.S.A.	U.S.A.S.	44	917.25	200.5
Third	Curtiss CR-2	H. J. Brow, Lt.U.S.N.	U.S.N.	40	938.15	193.
Fourth	Curtiss CR-1	A. J. Williams, Ensign, U.S.N.	U.S.N.	8	957.96	187.

"I was lost four times in the haze," Lieutenant Maughan, pilot of the winning Curtiss plane, told the press. "I was stunned more or less at the fifteen turns. My worst moments, however, were at the turn at Gaukler's Point. For a second I lost confidence and then became temporarily unconscious."

Lieutenant Maitland, who finished second, in another Army-Curtiss Racer, flew part of the way with one hand, the other engaged in pumping gasoline. Lieutenant Brow, who finished third, in a Navy-Curtiss Racer, flew a fine clean race. Ensign Williams, pilot of the Navy-Curtiss which finished fourth, suffered a peculiar mishap. The fire extinguisher which he carried in the cockpit became loosened and fell into his lap. He did not dare to throw it overboard, so carried it wedged under his arm, where it leaked and added to his discomfort.

The analysis of the results of the race, as given in the Appendix, shows that there was only about 4 minutes, 18 seconds difference in the elapsed time of Maughan and Williams. The plane which Williams flew was the 1921 Navy Racer, slightly refined. Translated into miles per hour, however, this difference is seen to be considerable, or slightly in excess of nineteen miles. Maughan, Maitland, Brow and Williams piloted Curtiss machines equipped with the new Curtiss-wing-type radiator and with the Curtiss 400 h.p. motor, which the foreign air attaches, guests at Selfridge Field, united in declaring to be the greatest contributions of the year to the art of flying. All four ships had Curtiss propellers. Throughout the race all the Curtiss motors performed 100 per cent.

Three World Speed Records

In this race Maughan established two world speed records, 100 and 200 kilometers (closed circuit.) Four days later, General Mitchell, flying Maughan's machine, established a world speed record for one kilometer (straightway). The figures were:

Plane	Pilot	Racing No.	Speed M.P.H.	Speed K.P.H.	Motor	H.P.
Distance						
1 Kilometer (straightway)						
Curtiss High Speed Pursuit	Brig. Gen. Wm. Mitchell	43	224.28	361.28	Curtiss D-12	375
100 Kilometers (closed circuit)						
Curtiss High Speed Pursuit	Lieut. R. L. Maughan	43	205.31	330.4	Curtiss D-12	375
200 Kilometers (closed circuit)						
Curtiss High Speed Pursuit	Lieut. R. L. Maughan	43	205.94	331.46	Curtiss D-12	375

Note: The above records for 100 kilometers and 200 kilometers were made during the Pulitzer Trophy Race and consist of laps 1 and 2 for 100 kilometers and laps 1, 2, 3 and 4 for 200 kilometers.

Times and speeds for four trips over course:

	Seconds	M.P.H.	K.P.H.
SE bound; first flight, time	9.17	243.94	392.59
NW bound; second flight, time	10.95	204.29	328.77
SE bound; third flight, time	9.25	241.83	389.19
NW bound; fourth flight, time	10.76	207.89	334.57
Average of speeds for four trips		224.48	361.28

Previous World Records

The previous world records for the above distances were:

Date	Place	Pilot	Plane	Engine	Speed
Distance					
1 Kilometer (straightway)					
Sept. 21, 1922	Etampes, Fr.	Lecointe	Nieuport Delage	340 H.P. Hispano	213.575 M.P.H.
100 Kilometers (closed circuit)					
Oct. 1, 1921	Villesauvage	Brackpapa	Fiat	700 H.P. Fiat	185.58 M.P.H.
200 Kilometers (closed circuit)					
Oct. 1, 1921	Villesauvage	Kirsch	Nieuport Delage	300 H.P. Hispano	174.77 M.P.H.

Four Miles a Minute

Brilliant as our recognized records are, the speed of 232 miles an hour unofficially (though observed by army timers) made by Lieutenant Maughan on October 16th, in his Curtiss Racer, is even more impressive. This means that he flew at the rate of nearly four miles a minute—a speed never before attained by man.

Fifteen Planes Start; Eleven Finish

Of the fifteen planes starting, only four failed to finish. Of the eleven completing the course, seven exceeded the world record of 1921 and subsequent world records. This may be regarded as an achievement unparalleled in the history of flying.

Lieut. E. H. Barksdale and Verville-Sperry Monoplane, Wright engine, fifth in Pulitzer Race. *Below*—Verville-Packard Racer, Packard engine, sixth in Pulitzer Race; Lieut. C. C. Mosely, pilot.—Photos, U. S. Army Air Service.

Lieut. F. B. Johnson in Verville-Sperry, Wright engine, seventh in Pulitzer Race. *Below*—Loening Monoplane, Packard engine, eighth in Pulitzer Race; Lieut. F. C. Whitehead, pilot.—Photos, U. S. Army Air Service.

Furthermore, analysis shows that those elements which magnified the importance of the Curtiss victory, tended to compensate for the sacrifices and less spectacular contributions by the other entries. General Patrick and Admiral Moffett, enthusiastic as they were over the winners, were professionally critical in their eventual analysis of all results and they found that, tremendous though the value of proved design, material and workmanship was, there was great worth also in having demonstrated, under practical conditions, what could not be done.

Verville-Sperry Establishes Monoplane Record

Verville-Sperry Racer No. 49, entered by the Army, took fifth place, with an elapsed time of 51.28.70 or speed at the rate of 181.2 miles an hour. This plane was powered with a Wright H.-2, 350 h.p. motor and was piloted by Lieutenant Barksdale. Each lap flown showed a consistent excess over the previous world's record. The Sperry ship was equipped with retractable chassis. The engineering of the plane was an interesting example of adapting a new design to the motor and streamlining the whole. For 20 minutes this Sperry racer held the world's record and when it completed the course it still retained the position of the fastest monoplane ever built.

Verville-Packard Adds 22.4 m.p.h. to Speed

Sixth place was taken by the Verville-Packard, powered with the Packard 600 h.p. engine—the same plane and engine, with refinements and streamlining which, in 1920, won the First Pulitzer Race at an average speed per hour of 156.5 miles. The performance of this ship, several years old in design and production, was regarded as remarkable. The motor, released from much of the unnecessary burden which held it back two years previously, thus was enabled to add 22.4 miles an hour to its own performance record, making it 178.9 m.p.h. This Packard motor performed with 100 per cent efficiency throughout the race, as did all the other Packard engines participating.

Second Verville-Sperry Finishes Seventh

Another of the three Verville-Sperry ships, No. 58, flown by Lieutenant Johnson, came in seventh at an average speed of 178 flat, or practically two miles an hour faster than the 1921 Pulitzer winner. This plane, too, was equipped with the Wright H-2 350 h.p. motor. As in No. 49, the engine streamlining was such as to enable the pilot to get high speed without difficulty.

Loening Contribution to Type and Speed

Eighth and ninth places were taken, respectively, by Lieutenant Whitehead and Lieutenant Schulze in the Loening High Speed Pursuit Planes, Nos. 45 and 46, equipped with the Packard 600 h.p. engine. Mr. Loening, from the time he first laid out his design, stated that what he sought was the creation of a service ship, one with features easily adaptable to practical Army flying and that in consequence he chose to sacrifice speed to other elements. The respective time for Nos. 45 and 46 were 170 and 162.2 miles an hour.

Thomas-Morse Work in Metal

The only all-metal ships entered in the contest were those of the Thomas-Morse Aircraft Corporation. The art of working duralumin or steel alloys is comparatively new to the American aircraft industry and when Thomas-Morse undertook to design an all-metal pursuit ship, new in manner of fabrication as well as in character of design, they handicapped their chances of victory by the use of this construction. The attempt marked a real contribution to the art. Knowledge of metals was wanted. It was known that European nations, particularly the French, were steadily expanding their skill in duralumin and steel. So the work of conception, experimentation and fabrication began. To have attained the results in a few months won unstinted praise and congratulations for the Thomas-Morse company. The all-metal planes, Nos. 48 and 47, flown respectively by Lieutenant Bissell and Captain Hunter showed speeds of 155.5 and 154.2 miles an hour. They were equipped with the Packard 600 h.p. engine.

Navy-Wright Sesquiplane

Of the four planes that did not finish the course, most interest attaches to the Navy-Wright NW-1, whose design, fabrication and test occupied probably less time than the Thomas-Morse. It is a ship specially conceived to meet the Navy's needs. Its sesquiplane design, striking and impressive, compared with many of the other smaller entries, was worked out jointly by Navy and Wright engineers and embodies some of the European ideas, as well as certain novel ones which were to be tried out at Detroit. The plane was new, and the engine, Wright 600 h.p., was even newer. Of all the motors in the field, this had undergone least demonstration. It was fresh from assembly, and when rolled to the starting line for the Pulitzer Race took the air in what really amounted to a laboratory test. Its average for the three laps spent in the air was close to 186 miles an hour.

The faith of the Navy Department and the Wright Corporation in plane and motor was fully justified some months after the Pulitzer race, when the second NW was completed and put through severe trials on Long Island. Although this second plane was as purely experimental as the first, it attained average speeds (both with and against the wind) of 207 miles an hour straightway.

The NW-2, sister ship of the Detroit Racer, in special tests conducted by the Navy Department to check up on the power plant as well as the ship, was flown wide out for five hours at a speed in excess of 200 miles an hour. Development of this plane by the Wright Corporation, in collaboration with the Navy, is continuing.

The third of the three Sperry monoplanes, piloted by Captain Streett, also powered with a Wright engine, went four laps at a steadily increasing rate of speed. The two remaining entries that did not complete the course were Lieutenant Galloway's Bee Line Racer (BR-1), and Captain Mulcahy's Thomas-Morse MB-7, both of which went out at the end of the second lap from radiation or lubrication troubles.

Appraising the Results

When the winning pilots lightly skimmed the turf and brought their machines to full front stop before the official section of the grand stand, Secretary of the Navy Denby, Assistant Secretary of War Wainwright, Generals Patrick and Mitchell, Admiral Moffett, the air attaches of Great Britain, France and Italy and military or naval representatives of half a dozen other countries, including Japan, Mexico, and Brazil, were on the field to extend congratulations.

The foreign air attaches were especially enthusiastic. Captain Thenault, representing France, went to Maughan's machine, touched the wing radiator and found it cool, shook the craft and found it as taut and perfect as when it took off. That evening, as he prepared to return to Washington, he said: "I am writing my Government that in aviation they have two American achievements to surpass, one is the Curtiss motor and the other is the Curtiss wing-type radiator." This commendation from an officer in the French Air Service, which is the leading aviation service in the world, in ready equipment and available personnel, was more significant than the naturally joyful appreciation of our own officers.

In the November, 1922, issue of the U. S. Air Service Magazine, Major General Patrick wrote what are regarded as his official observations as Chief of the Air Service, as follows:

"These achievements bring back to the United States, the birthplace of aviation, that preeminence in flight which for a space was lost, but now

should be held by us for all time. A speed of four miles a minute, obtained at Detroit, shrinks the United States to the size of Texas. This purely military performance points the way to commercial success. In solving its own problems, the Air Service has therefore benefited all those interested in the development of aerial navigation. In the results of these contests at Detroit, the layman sees nothing more than a rather amazing performance and the breaking of old records. To the initiated, meaning those who really made these results possible, they indicate that the efforts have been along the right lines, that no revolutionary changes in basic calculations and structures are necessary, but that the problems of the future are merely those of refinement in the design of planes and engines.

"We must not, however, rest on our laurels. There is much work to be done. We know that the equipment now in use is, much of it, out of date. We are likewise sure that we know how to secure better aircraft and we must not rest until all of our equipment reaches a proper standard. The Detroit meet has given us food for thought, but this must be translated into action."

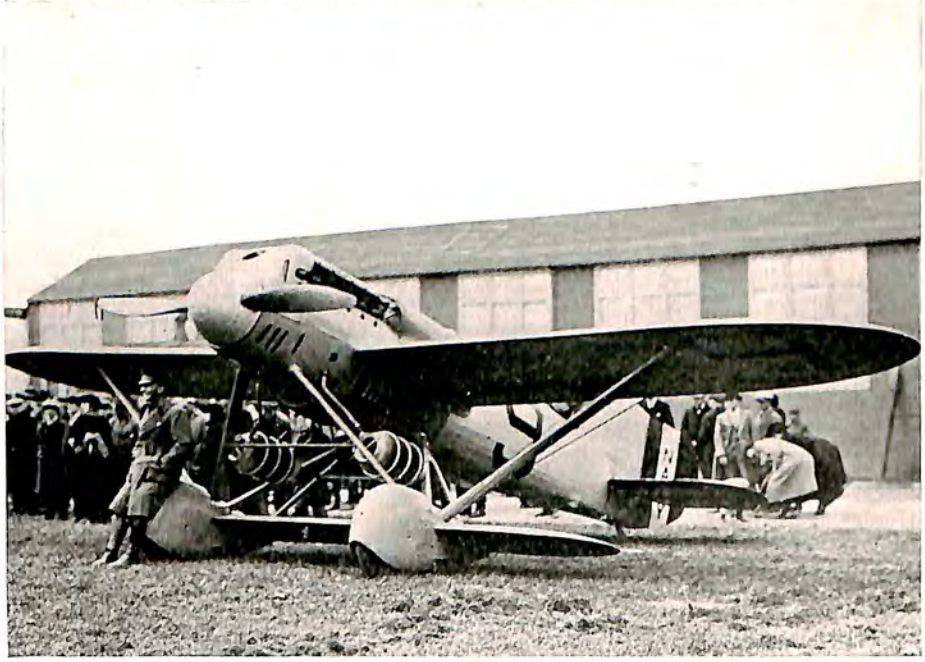
Aside from the more spectacular features of the National Airplane Races there was the indisputable demonstration of safety in flight under conditions which, according to the popular misconception of the air, would seem to invite accident. The races attracted approximately 200 airplanes from various fields or stations throughout the country. More than 292,372 miles were flown over the courses and cross-country, without a single accident or injury.

Of the 200 flying craft, 121 were Army Air Service machines. Eleven were flown to Selfridge by officers of the Naval Bureau of Aeronautics from Naval Air Stations in the East and South. Twelve were U. S. Mail planes, one from each of the principal controls on the New York-San Francisco route—all flown to Detroit for the meet, after which they were flown back to home ports, as were the other visiting machines.

Twenty-eight of the visiting machines were civilian. Seventy passengers traveled in these planes on the round trip flight. The Great Lakes Division of Aeromarine Airways, Inc., operated from its Detroit base and with three flying boats, the *"Buckeye," "Nina"* and *"Niagara,"* carried 193 passengers between Detroit and Selfridge Field during the period of the races. One of the longest over water flights was made by the *"Wilbur Wright,"* a Standard Loening air yacht, with 300 h.p. Wright motor, used as a dispatch boat of the Wright Aeronautical Corporation, which is based at New York City.

During the races alone, the Army Air Service flew 94,365 miles, the Navy and Marine Corps 7,695 miles and civilians at least 150 miles, a total racing mileage of 102,210 miles. At least ten times that much mileage was flown in practice flights before the races. Visiting army planes flew 147,237 miles, visiting Navy and Marine Corps, 20,927 miles; the Air Mail, 12,000 miles and civilians 10,000

Lieut. L. D. Schulze, Loening High Speed Pursuit, Packard engine, ninth in Pulitzer Race. *Below*—Lieut. C. L. Bissell, Thomas-Morse High Speed Pursuit, Packard engine, tenth in Pulitzer Race.—Official Photos, U. S. Army Air Service.



Thomas-Morse, Packard engine, Capt. F. O. D. Hunter, pilot, eleventh in Pulitzer Race. *Below*—Navy-Wright, Wright engine, Lieut. L. H. Sanderson, pilot.—Official Photo, U. S. Navy

miles—an aggregate of 190,162 miles traversed cross country before and after the races, not including the practice flights. This, added to 190,162 miles of cross country flying, makes a total of 292,372 miles of flying in connection with the Detroit events.

There were no serious accidents. No one was injured. Hundreds of thousands of persons witnessed the demonstrations. Uncounted thousands in every corner of the United States read in their local papers accounts of our achievements in the air. A majority of the racing craft were new types on which the pilots had not been trained until shortly before the races. And they brought all the speed records of the world to America!

—From *N. Y. World.*

CHAPTER IV

THE SECOND AERO CONGRESS AND FORMATION AT DETROIT OF NATIONAL AERONAUTIC ASSOCIATION

THE great strides made in the development of aviation during and particularly since the World War made necessary to America new methods and new agencies.

The war had made interest in American aviation truly national in scope and there existed for the great mass of the people no organized channel of contact with aeronautical affairs. There was need of harmonizing all civil interests in one body representative of the man in the street. The formation of the National Aeronautic Association at Detroit in response to this need was one of the outstanding features of the aeronautic history of 1922.

The preliminary work toward this organization required more than a year of intensive and extensive effort. The first step was taken by the Aero Club of America, the premier air body of our country, in an effort to nationalize its activities and membership. It was met enthusiastically by the American Flying Club, a later organization, and the amalgamation of these two bodies resulted. To still further the scheme of broadening of America's wings, a convention was held at Omaha in November, 1921, in connection with the National Airplane Races of that year. From this convention sprang the National Air Association, pledged to co-ordinate all activities toward a national aeronautic organization. The most important committee appointed was that to confer with the Aero Club of America toward this end.

The Aero Club of America responded cordially and named a similar committee which, meeting with the representatives of the National Air Association, appointed Howard E. Coffin of Detroit chairman. Mr. Coffin is one of the most widely known figures in American aviation. Chairman of the Aircraft Production Board during the war, a member of the Naval Consulting Board, the Council for National Defense and of the American Aviation Mission to Europe, he was especially interested in preparedness for national defense.

Associated with Mr. Coffin in the early stages of advance organization were Benedict Crowell of Cleveland, president of the Aero Club of America; Sidney D. Waldon of Detroit, president of the

National Air Association; B. H. Mulvihill of Pittsburgh; Caleb S. Bragg of New York; Gould Dietz of Omaha; D. M. Outcalt of Cincinnati; Maurice G. Cleary, former Secretary of the Aero Club of America; Godfrey Cabot of Boston; Henry A. Wise Wood of New York; Charles Jerome Edwards of Brooklyn; John B. Coleman, Sioux City, Iowa; Lorillard Spencer, Richard F. Hoyt, and Cortlandt Field Bishop of New York; F. Trubee Davison and Philip J. Roosevelt of Long Island; A. B. Lambert of St. Louis; Charles E. Merrill, James A. Blair, Jr., and Philip Carroll of New York; and many other nationally prominent American citizens.

It was realized early in the organization period that the prestige, good will and assets of the Aero Club of America were essential to the new national association. Accordingly a fund was raised by private subscription to purchase such assets, including the license of the Federation Aeronautique Internationale, the international governing body in aviation sports. Upon the purchase of these assets legal title thereto was transferred to three trustees, Rear Admiral W. F. Fullam, U. S. N., retired; Charles Thaddeus Terry, dean of the Columbia Law School; and H. B. Thayer, president of the American Telephone and Telegraph Company; to hold such property pending the formation of the new association.

Call for Aero Congress

The joint committee of the Aero Club of America and the National Air Association, headed by Mr. Coffin, after mature deliberation, decided that no small group of individuals, however authorized by existing bodies, was competent or privileged to dictate the provisions of the new body. Consequently it was decided that a call be issued for duly accredited delegates, elected by impartial caucuses and conventions, or appointed by civic and aeronautic organizations throughout the country, to meet in Detroit at the time of the 1922 National Airplane Races and there draw up the framework and elect the officers of the desired national body. Preliminary to this, consent was obtained from the governors of the Aero Club of America and from the governors of the National Air Association for the absorption of their two bodies by this broader association as soon as it was given life at the Detroit convention. Too much praise cannot be accorded this generous attitude upon the part of these two associations, without whose unselfish aid the new association could not have been formed.

In preparation for the Detroit convention there was formed an Advance Committee on Organization, first planned to include one hundred prominent American citizens. So enthusiastic was the

response, however, that this committee was later enlarged to include five hundred. An executive committee, responsible for the details of the Detroit meeting, was formed as follows:

Howard E. Coffin, Chairman, Detroit, Michigan
Dr. Joseph S. Ames, Chairman Executive Committee, National Advisory Committee for Aeronautics, Baltimore, Md.
W. T. Anderson, Editor Macon Telegraph, Macon, Ga.
Bion J. Arnold, Chairman Chicago Air Board, Chicago, Ill.
H. H. Bullen, American Steel & Wire Co., Denver, Colo.
Godfrey L. Cabot, President Aero Club of New England, Boston, Mass.
John B. Coleman, Sioux City, Iowa
C. Goodloe Edgar, Chairman Aviation Committee, Board of Commerce, Detroit, Mich.
Samuel M. Felton, President Chicago Great Western Railway Co., Chicago, Ill.
W. F. Fullam, Rear Admiral U. S. N., retired, Washington, D. C.
Alfred W. Harris, Air Board of Cleveland, Cleveland, O.
James Hartness, Governor of Vermont, Springfield, Vt.
Richard F. Hoyt, Hayden, Stone & Co., New York
C. F. Kettering, Chairman Ohio Aviation Commission, Dayton, O.
John D. Larkin, Jr., Larkin Company, Buffalo, N. Y.
W. P. McCracken, Chairman Aviation Committee, American Bar Association, Chicago, Ill.
Glenn L. Martin, Cleveland, O.
James Meissner, Commanding National Guard Air Unit, Birmingham, Ala.
Ben W. Olcott, Governor of Oregon, Salem, Oregon
D. M. Outcalt, Cincinnati, O.
Frederick Patterson, National Cash Register Co., Dayton, O.
L. C. Pickering, San Francisco Bulletin, San Francisco, Cal.
Otto Praeger, formerly Assistant Postmaster-General, New York
W. F. Roberts, Bethlehem Steel Co., Sparrows Point, Md.
J. A. Steinmetz, Aero Club of Pennsylvania, Philadelphia, Pa.
Charles Thaddeus Terry, Executive Committee, American Bar Association, New York
Edgar G. Tobin, San Antonio, Texas
Sidney D. Waldon, President National Air Association, Detroit, Mich.
Arthur Woods, formerly Chief of Personnel, U. S. Air Service, New York

The purposes of the convention and the proposed policies of the new association were circulated widely by the Advance Committee on Organization as follows:

"(a) To maintain in the headquarters of the association in Washington an agency capable of voicing a vigorous public opinion upon beneficial and essential legislation in all matters of aviation;

"(b) To awaken and educate the public mind to the possibilities of aviation, both as a vital means of national defense and as a transportation factor in the commercial development of our country;

"(c) To supply an impartial medium through which the thought of all sections of the country may be collected, collated and harmonized into a national expression of opinion;

"(d) To encourage and promote the study and advancement of the science of aviation, and to maintain an institution which will collect and disseminate general and technical data for the development of the industry;

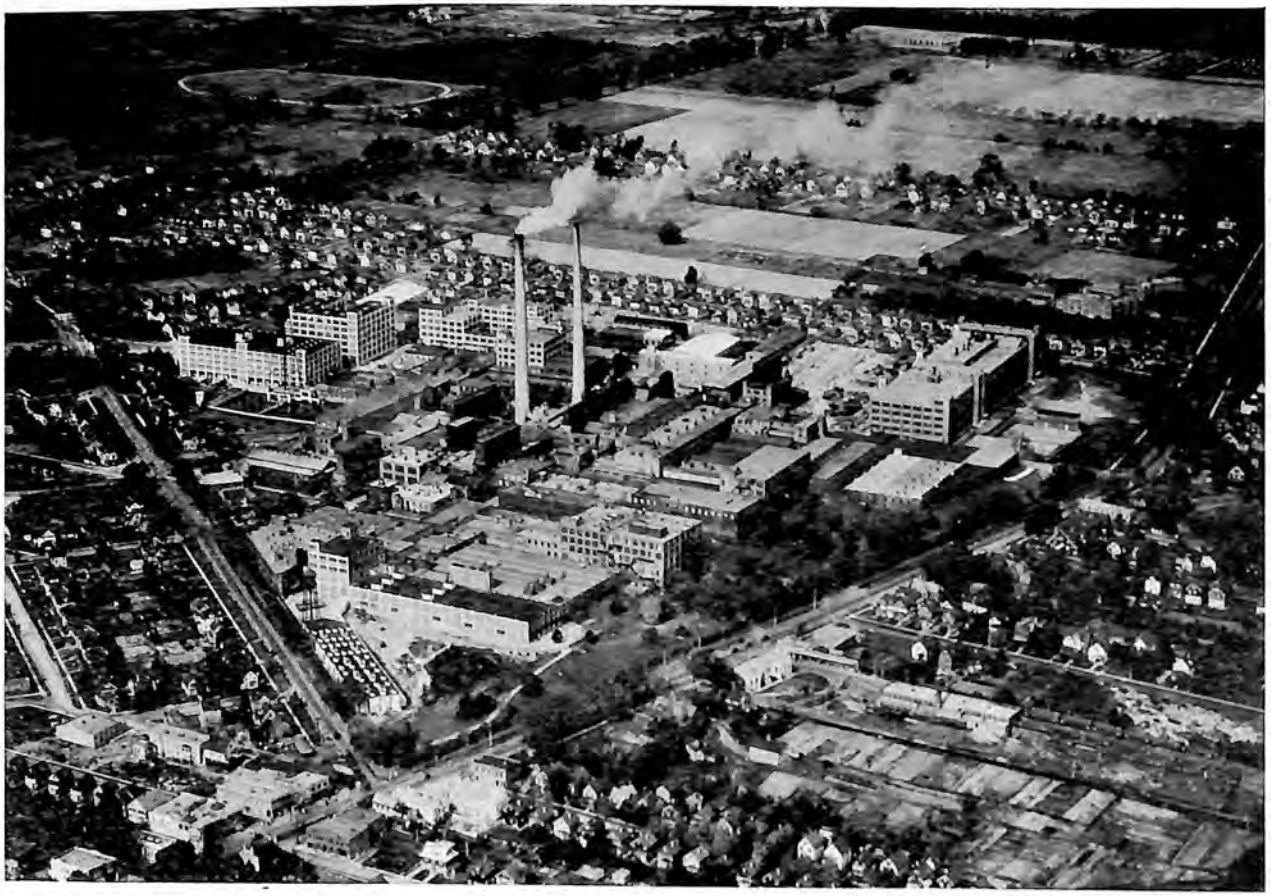
"(e) To sanction and actively supervise under license of the Federation Aeronautique Internationale all contests, trials, competitions and other events involving aerial craft or apparatus, and to approve all records in connection therewith."

Expressions of advice were sought on the manner of conducting the proposed convention and such opinions were published and circulated in advance of the meeting, together with a suggested set of by-laws for preliminary study by the prospective delegates, thus enabling such representatives to be prepared for more immediate action upon the framework of the new association. It was, however, emphasized in all such literature that all matter and arrangements were wholly tentative and subject to ratification and changes by the convention, many such changes being actually made later.

Executive offices of the Advance Committee on Organization were opened, those in Washington being under H. E. Hartney and those in Detroit under Hugh W. Robertson. From these offices considerable literature, credentials, correspondence and general publicity were circulated during the summer of 1922 to encourage attendance at the Detroit convention. The basis of representation was deliberately made liberal and broad, including representatives of aero clubs or similar bodies, air boards, chambers of commerce, mayors or city commissioners; or members of the Advance Committee on Organization, holders of F. A. I. or military brevet, commanding officers or reserve aviation units, field superintendents of air mail, federal government bureau chiefs, members of the House of Representatives and of the United States Senate. No contest arose at any time over representation and the work of the Advance Committee on Organization was later approved unanimously by the Detroit convention.

Mention should be made of a tour of the country by Admiral Fullam linking up the various cities with the Detroit convention and also urging the holding of district conventions for the election of delegates and the formation of air boards. The seventh district meeting was held at Sioux City, Iowa, followed by another at Milwaukee. The fifth district then met at Cedar Point, Ohio, followed by an organization meeting of the eighth district in San Antonio and the fourth district in Atlanta. The third district organized at Baltimore and other districts effected tentative organization. All nine districts, based geographically upon the military corps areas, were represented at Detroit.

OFFICERS, NATIONAL AERONAUTIC ASSN.
Top—Left, H. E. Coffin, President; B. H. Mulvihill, Vice-President.
Bottom—Left, J. B. Coleman, Secretary; B. F. Castle, Treasurer.



Aerial of Rochester, N. Y., showing Eastman Kodak Company's plant. Taken with Eastman K.-2 Aero Camera on Eastman Aero Panchromatic Film.

Wide Official Endorsement

Endorsement of the movement to form the new association was almost unanimous from the government, including co-operation from Maj. Gen. Mason M. Patrick, Chief of U. S. Air Service; Rear Admiral W. A. Moffet, Chief of Bureau of Aeronautics of the navy and their respective assistants, Brig. Gen. William Mitchell and Capt. H. C. Mustin; Dr. S. W. Stratton of the Bureau of Standards; Dr. G. W. Lewis of the National Advisory Committee for Aeronautics; and Col. Paul Henderson, Second Assistant Postmaster General, in charge of the U. S. Air Mail Service.

Secretary Weeks of the Army, Secretary of Commerce Hoover and Secretary Denby of the Navy, who was the principal speaker at the convention banquet, were also enthusiastic in their co-operation.

President Harding, on September 6, 1922, wrote from the White House as follows:

My Dear Mr. Coffin:

I have many times given expression to my interest in the development of aviation. I fully realize the influence which this newest and speediest means of transportation and travel is destined to exert upon civilization.

Aviation's vitally important part in the general scheme of our own national defense is already well recognized. A strong and healthy commercial aviation development is a prerequisite to all adequate plans involving our national security and welfare.

Therefore, it is with the greatest satisfaction that I extend to the Detroit Aviation Society and, through your committee, to the National Aeronautic Association my sincere appreciation of the objects you are seeking and my best wishes for the complete success both of the October contests and of the national convention to be held coincident therewith.

Sincerely yours,

(Signed) Warren G. Harding.

Mr. Howard E. Coffin,
Chairman, Committee on Organization,
National Aeronautic Association.

National Aeronautic Association Formed

With this unqualified endorsement of the administration, with the full approval of the entire aviation field in America, and with a definite guiding purpose, the first sessions of the National Aeronautic Association opened in the Board of Commerce at Detroit on October 12th and continued throughout the two succeeding days. Formal ratification of the charter of incorporation was made early on the morning of October 14th and the charter dispatched by airplane to Hartford, Connecticut, where incorporation was completed that day before the closing of the Detroit convention. More than four hun-

dred delegates from every section of the country proceeded on the last evening to elect the following officers:

President: Howard E. Coffin, Detroit, Mich.
Vice-President: Bernard H. Mulvihill, Pittsburgh, Pa.
Treasurer: Benjamin F. Castle, New York.
Secretary: John B. Coleman, Sioux City, Iowa.

Governors elected, two from each of the nine districts, were:

First district: Porter Adams, 1352 Beacon Street, Boston, Mass.
Godfrey L. Cabot, 940 Old South Bldg., Boston, Mass.
Second district: John D. Larkin, Jr., Buffalo, N. Y.
Maurice G. Cleary, New York City.
Third district: L. F. Sevier, Forbes & Craig Streets, Pittsburgh, Pa.
R. J. Walters, 500 Pennsylvania Ave., Baltimore, Md.
Fourth district: L. Sevier, Alabama Manufacturers' Assn., Birmingham, Ala.
Van H. Burgin, 217 Healy Bldg., Atlanta, Ga.
Fifth district: Glenn L. Martin, Cleveland, Ohio.
D. M. Outcalt, Traction Bldg., Cincinnati, O.
Sixth district: Charles S. Reiman, 22 West Monroe St., Chicago, Ill.
Sidney D. Waldon, 4612 Woodward Ave., Detroit, Mich.
Seventh district: Ralph W. Cram, Davenport, Iowa.
Howard F. Wehrle, 503 Railway Exchange Bldg., Kansas City, Mo.
Eighth district: Edgar G. Tobin, Roman & Oakland Streets, San Antonio, Texas.
William Long, San Antonio, Texas.
Ninth district: P. G. Johnson, 2432 North Broadway, Seattle, Wash.
C. H. Messer, 1302 West Second Ave., Spokane, Wash.

At the first governors' meeting, held following the convention in Detroit, powers to set up headquarters and executive staff in Washington was delegated to the officers. H. E. Hartney was named general manager and committees were appointed to function on Legislation, Publicity, Contests, Finance, Foreign Relations and Membership. An executive was placed in charge of the detail work connected with each of these committees and offices opened at 26 Jackson Place, Washington, where the organization has now grown to much larger basis.

Immediate carrying out of the policies enumerated above in the work of the Advance Committee on Organization was determined upon and within a short period the National Aeronautic Association became known throughout the world as the American aeronautic body qualified to represent aviation for the American citizen. Transfer of the license of the Federation Aeronautique Internationale was effected on January 1, 1923, and steps were immediately taken for the awarding of the trophies for 1922 and for arrangements for 1923 contests. The Pulitzer Trophy Race, the speed classic of the world, was awarded to St. Louis after spirited bidding from Chicago,

San Diego, Atlantic City, Detroit and other cities. The annual convention of the National Aeronautic Association will be held in that city coincident with the National Airplane Races which follow the Pulitzer Trophy annually. Arrangements for the races are being made by the Contest Committee.

Seek Nation-Wide Membership

The principal work of the new association, since its inception at Detroit, has been to so publicize its activities and policies that a large membership may be secured. It was realized that the strength of the new body rested upon its ability to truly represent the citizenry of the country. Plans were accordingly laid to first secure the endorsement of the aims of the association from prominent individuals and organizations and, once these were obtained, to go before the public for membership. At the time of publication elaborate plans are being begun to effect a national membership drive in every part of the country. It is hoped that the association will become to aviation what the Navy League is to the Navy, what the Grange is to the farmer, what the American Legion is to the veteran of the World War.

A diffusion of membership throughout the whole country is especially desired. The defect of previous organizations, it has been felt, is that membership has been too closely confined to certain geographic sections. To be truly representative the new association desires membership scattered relatively as is the population of the country and reports at this time indicate that such basis is being obtained. Through this diffusion all sections of the country will be equally represented and will receive from other sections the news of aviation's progress.

Recognition of the importance of the new association by the business world led early in the spring to an invitation from the United States Chamber of Commerce for the president, Mr. Coffin, to attend the International Convention of the Chambers of Commerce of the world in Rome in March, as the aeronautical delegate from America.

Before leaving for the European trip Mr. Coffin said:

"That trite saying 'In Union there is strength' is a truism and the greater the membership the greater good we can do. The National Aeronautic Association is destined to do great things. All that the American Automobile Association, with its half-million members, has done for motor car transportation, for good roads and for legislation, this new national body proposes to do for aviation—and more. The National Aeronautic Association will surely grow

and prosper, fulfilling its great promise for the promotion of the aviation art and for the furtherance of our national security and welfare. I extend to every person in this country the invitation to join us in this unparalleled movement to *'Make America First in the Air.'*"

CHAPTER V

THE AIR MAIL 95 PER CENT EFFICIENT FOR YEAR; PREPARATION FOR NIGHT FLYING; STEPS TOWARD PRIVATE OPERATION

DURING the twelve months of 1922, twenty airplanes, coming and going over the divisions of the transcontinental Air Mail line, carried half a million letters every day, except Sundays and holidays. By an ingenious method of routing and transferring the pouches from plane to train and vice versa, whenever the schedule demanded, these half million letters daily arrived at their destination a day, and sometimes two days, ahead of the ordinary train mail.

Important as was this contribution to the acceleration of the general postal system, it was relatively of less significance than the impetus which was given to all commercial aviation, first, through practical experimentation in night flying, and, second, through the desire of the Post Office Department to turn over to private contractors as rapidly as possible the operation of the Air Mail.

Daylight Operation in 1922

Pilots and officials are rightly proud of their record for 1922—more than 95 per cent efficiency for the year. For ten weeks prior to September 16, 1922, the Air Mail Service had 100 per cent efficiency performance; and it was this remarkable record coupled to the all-year performance that caused the National Aeronautic Association to award to the Air Mail the Collier Trophy "for the most outstanding progressive achievement in aviation in 1922."

With seventy airplanes available, but with an average of forty actually ready, and of these a schedule requiring the use of only twenty machines a day, the forty pilots on the New York-San Francisco route made in all 7,999 flights between the sixteen mail fields or division points. They carried more than 1,500,000 pounds of first class mail averaging forty letters to the pound. Nearly 3,000 flights were made in stormy weather and in fog; of these, only 300 or so resulting in delaying the mails. Three mountain ranges were traversed—the Alleghenies, Rockies and Sierras, over which may be found the worst possible flying conditions. Near Reno, Nevada, for example, the pilots on several occasions found themselves meeting head winds that literally tossed them about for an hour or two

before they could bring the planes down to the field in safety. In the mountains the fields are the outposts of actual safety; for Nature has laid out few natural landing fields in the mountains. Many of the pilots carry snowshoes during the winter in order to make their way in case of a forced landing.

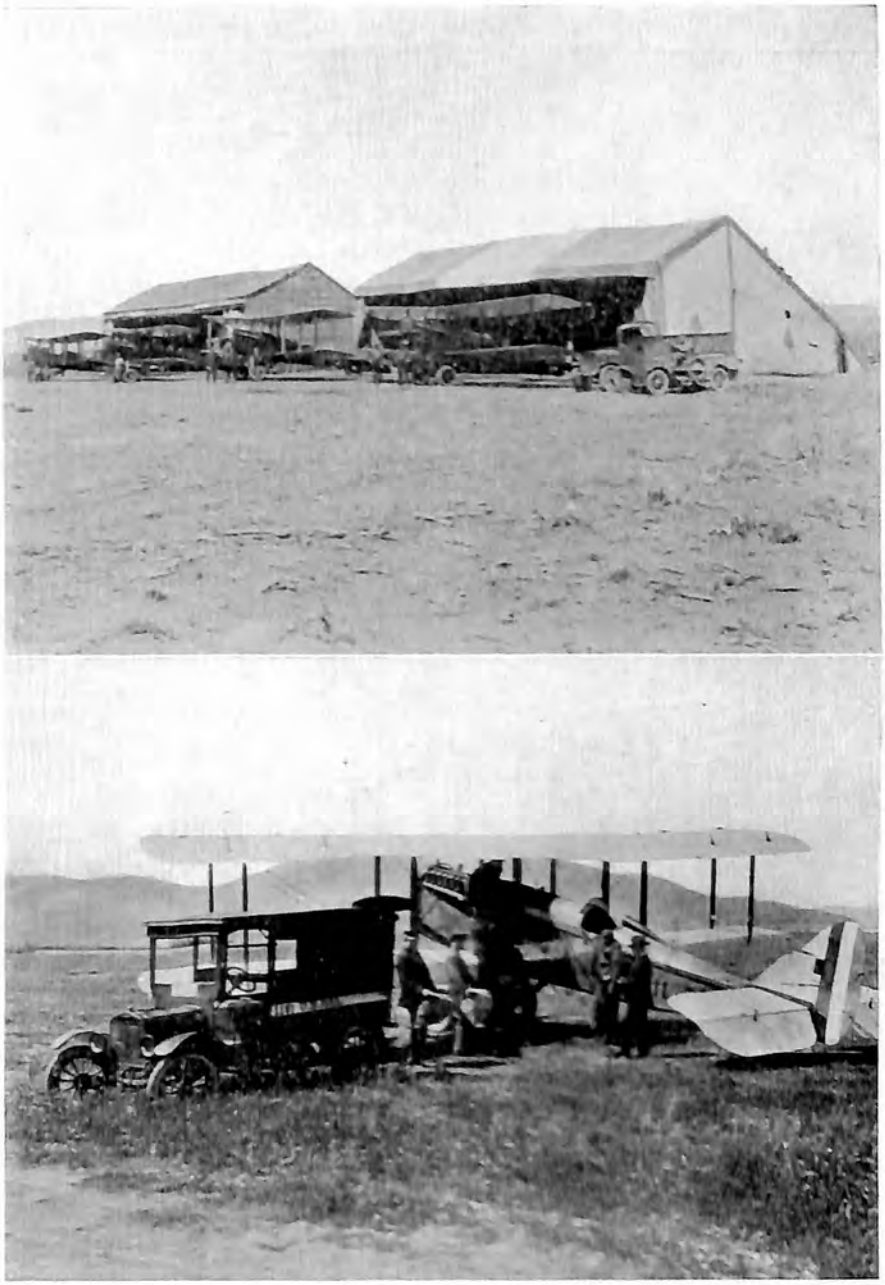
Yet they have managed to get through. They have had fewer delays than the trains, as a matter of fact; but they have had to climb 12,000 feet in the air to hurdle the continuous gales and heavy snow storms which sweep through the mountain passes—passes being the only natural landmarks when a pilot desires to check up his compass course.

Wireless Service Developed

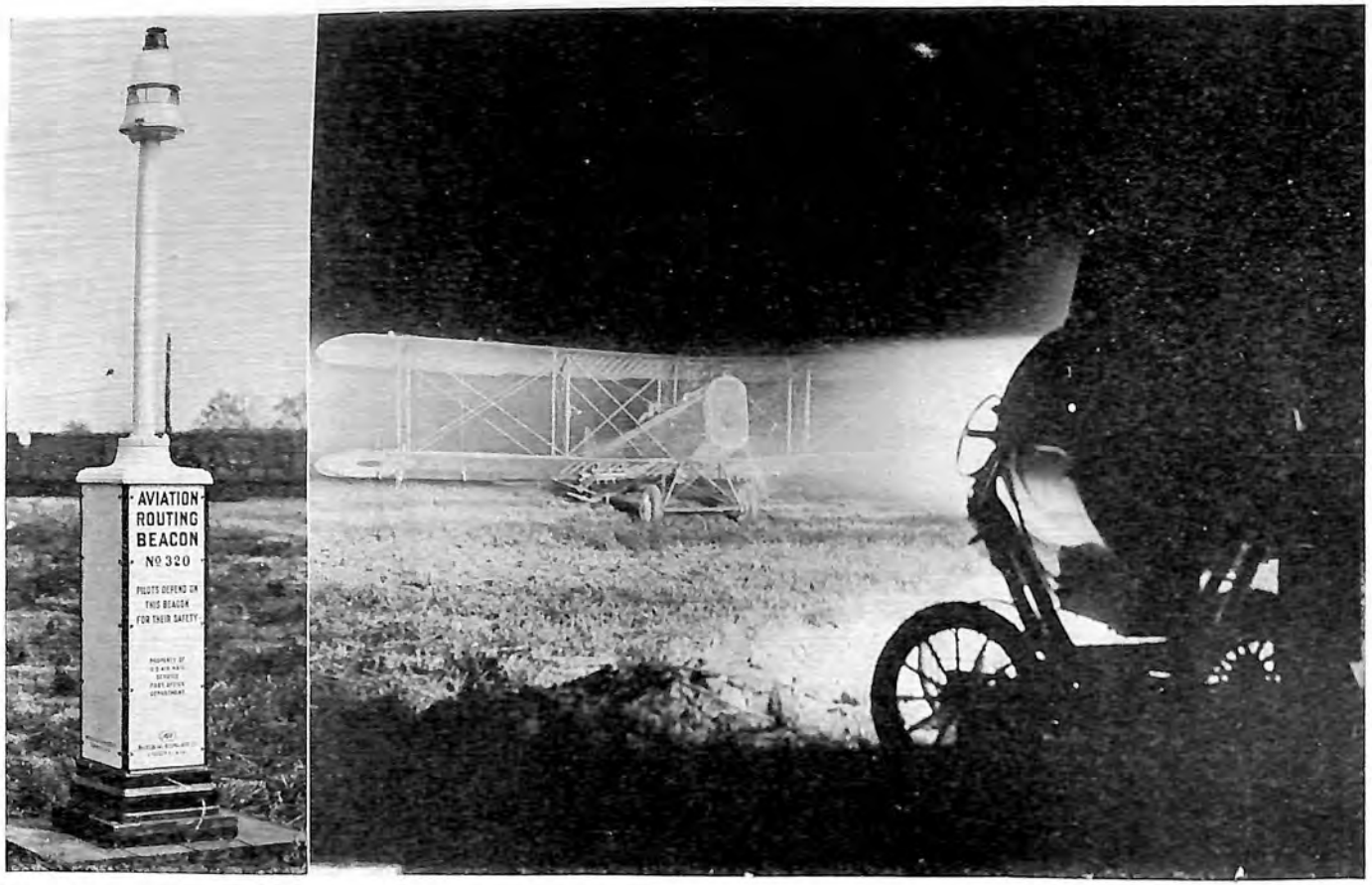
During the year the wireless service was so perfected that complete communications were afforded pilots and officials throughout the route. Radio operators were located at all the fields, excepting Rawlins, Wyo. At each field the operator keeps other divisions constantly informed of the weather over his territory and also relays all departmental messages and other meteorological data. This system has enabled the pilots to secure a fair idea of what to expect when setting out; and they are better able therefore to map out the route, determine the altitude at which they shall fly and whether or not to settle down on the nearest field or proceed on to the next.

The pilots have become so familiar with storms that they rarely abandon a trip unless mechanical trouble forces the plane to earth, and then the pilot secures another plane if there is one available. They have even borrowed military machines in order not to default on a trip. Without question their general efficiency—an efficiency which makes the Air Mail Service the most important transport service yet organized—is attributed to extensive training and experience. The ships are serviced as regularly and as expertly as a motor car in a garage, or more so. Before the planes commenced operating on schedule it required nearly a hundred hours to deliver a letter from one side of the country to the other. At the end of the year all delivery schedule had been cut along the entire route.

The mail planes leaving New York in the morning have carried letters which were mailed too late to make the night trains; but the letters are delivered in Cleveland the day after mailing. Mail bound for Chicago has been delivered twenty-four hours earlier than by the all-train method. And so on at Iowa City, Omaha, North Platte, Cheyenne, Rock Springs, Salt Lake City, Reno and San Francisco. Going and coming the first class mail has been advanced many hours. One can actually mail a letter in Chicago at 5:30 o'clock in the



Air Mail Station, Elko, Nevada. *Below*—Loading mail, San Francisco, Calif.—Photos, U. S. Army Air Service.



Left—AGA Aerial Beacon of American Gas Accumulator Co. *Right*—Sperry Gyroscope Co.'s Searchlight. Both are used in development of night flying by Air Mail.

afternoon and be reasonably assured that it will be delivered in New York the next afternoon. In many instances a letter is delivered between distant cities twenty hours earlier than if it made its journey all the way by train. While the service has saved many hours in delivery, officials believe they can cut the coast-to-coast schedules from eighty to less than thirty hours.

Each division on the transcontinental route has its own pilots, whose duties are confined to that division unless there is an emergency. The divisions making up the 2,680 miles between New York and San Francisco include: Eastern: New York to Iowa City, 965 miles; Central: Iowa City to Rock Springs, 930 miles; Western: Rock Springs to San Francisco, 785 miles.

According to the Postmaster General's report for the fiscal year ended July 1, 1922, there were at that time seventy planes in good flying condition as compared with thirty-six planes on July 1, 1921. The number of employees was reduced from 521 in 1921 to 372 at the close of the fiscal year 1922. This includes thirty-nine pilots who receive an annual basic salary of $2,000 in addition to which they receive mileage pay, 5, 6, or 7 cents per mile, depending on the routes they fly. On June 15, 1922, the air mail warehouse was moved from Newark, N. J., to Chicago, Ill., a more centrally located point from which distribution could be effected more efficiently and economically. The inventory of the Air Mail Service at the close of the fiscal year 1922 shows the value of its property to be $2,560,018. On January 1, 1923, there were sixty-two serviceable machines and thirty undergoing repairs. There were 189 Liberty motors in serviceable condition, and 420 awaiting overhaul.

Preparations for Night Flying

On taking office as Second Assistant Postmaster General, Col. Paul Henderson, succeeding the late Edward H. Shaughnessy, began a personal study of the Air Mail. Having had experience in private life, and during the war, in motor transport, he quickly discerned the imperative need for aviation to demonstrate its ability to operate by night as well as by day. On his entrance into the Cabinet as Postmaster General, Harry S. New brought to the Department sympathetic interest in civilian aviation and means by which the air mail could be of greater service.

Many inventions were perfected in 1922 tending to make flying easier and safer. It had been apparent for some time that in order to realize the full benefits from airplane speed, they must be operated throughout the twenty-four-hour day. Colonel Henderson summed up the policies of the Department when he said:

"The Air Mail Service desires to so employ all new methods in flying that by developing the service to its maximum efficiency, we can contribute in various ways to the general knowledge of the art and to commercial aviation. We believe it is by this policy that aviation will be developed."

It was in accordance with this idea that the Air Mail assigned to its pilots the task of checking up the needs as they saw them. Civilian scientists and engineers were called into conference, each bringing some new invention or improved apparatus believed to be valuable for night flying. The section between Chicago and Cheyenne—885 miles—was selected, the route passing through Iowa City, Omaha and North Platte. The plan was to fly between New York and Chicago in daylight, between Chicago and Cheyenne at night, and between Cheyenne and San Francisco in daylight—thus affording a thirty-hour service between the Atlantic and Pacific oceans. Engineers were sent over the route; and surveying crews and mechanical forces so organized that before night flying should be attempted there would have been made all possible preparation for conducting such a service safely and successfully. For the requirements for night flying are far different from those of a daylight system.

Flying at night is very much the same as trying to motor somewhere without headlights and with no road map, nor roads to speak of. Sending a pilot out at night is just that. For he is dealing with three dimensions—up, down and to one side or the other. At night he might as well be blindfolded unless he can be provided with means of vision—means which cannot fail. So many things were being done to make the night flying route successful that toward the end of the year Europe was sending over observers to learn just how the Air Mail planned to equal at night the efficiency it had shown by day.

Emergency Landing Fields First

Along the experimental night route between Chicago and Cheyenne emergency landing fields were being located, twenty-five miles apart. They were placed near the railroads and towns whenever possible. On many occasions they were leased from the farmers, with the provision that they should be kept always in readiness to receive an air mail plane, day or night. The location of these fields was determined by prevailing winds and condition of the surrounding country.

At each of these fields, like those at the main stations, aerial beacons, or lighthouses of the sky, were being set up or planned at the close of the year. The lighthouses were perfected by several organizations; one, the electric light with 5,000,000 candlepower, with

electricity generated by means of the motor which is used to run the truck on which it is installed, was developed by the Sperry Gyroscope Company of Brooklyn, N. Y. Another kind is the *AGA* Beacon, developed by the American Gas Accumulator Company of Elizabeth, N. J., and fed by acetylene gas controlled and made automatic by a method explained further on. Both beacons have a range of forty miles or so. Even in fog or storm they create a soft glow in the mist and murk, enabling a pilot caught in storm or fog to easily locate his field.

C. F. Egge, Superintendent of the Air Mail Service and engineers employed by the Department, made many inspection trips over the proposed night route before the ground forces were set to work leasing fields and putting them in shape for initial experiments. Several pilots had been assigned to the Army Air Service hangars at McCook Field, Dayton, to have lights installed on their planes, after which they were sent to Chicago and Cheyenne to conduct tests with various night flying equipment.

On each emergency field there will be various other lights, one in each corner of the field to show the pilots the limits of the reservation on which he is about to land. Then there will be another light flashing at intervals, by means of a dot and dash system, so that the pilot by noting the arrangement of dots and dashes may check up and know at just what field he is arriving. Then along the entire route every three miles there will be located another and smaller beacon, visible for seven miles. These beacons will form a straight line between each emergency field. A pilot will always have three of them within his range of vision.

Route Beacons and Field Illumination

The problem of night flying involves questions of setting signals to keep the pilot on his route and so illuminating emergency landing fields and terminals that he can land safely against the wind. The high powered aerial beacons of both the Sperry Gyroscope Company and the American Gas Accumulator Company were tested at McCook Field, and at the air station at Hampton Roads. That of the American Gas Accumulator Company is similar to the one at Croydon Airdrome, England, which was made by the English unit of the international corporation of which the American company is a member. Those beacons are automatic; that is, no human energy is required to turn on the light in darkness, fog or storm. Instead, the *AGA* beacons, all of which, including the ground lights and the three-mile route lights, operate by means of a sun valve, the invention of Dr. Dustaf Dalen of Sweden. It is worked by the action of

solar radiation and is so designed as to be operative under all temperature changes. Briefly, the system employed is that a central black body is surrounded by highly polished pillars. The sunlight and in this instance light means heat, falling on these columns expands the black portions and is reflected off the polished surfaces. The difference in expansion opens and closes the gas valves by means of an intricate clocklike mechanism. The lights turn on automatically during an eclipse or storm.

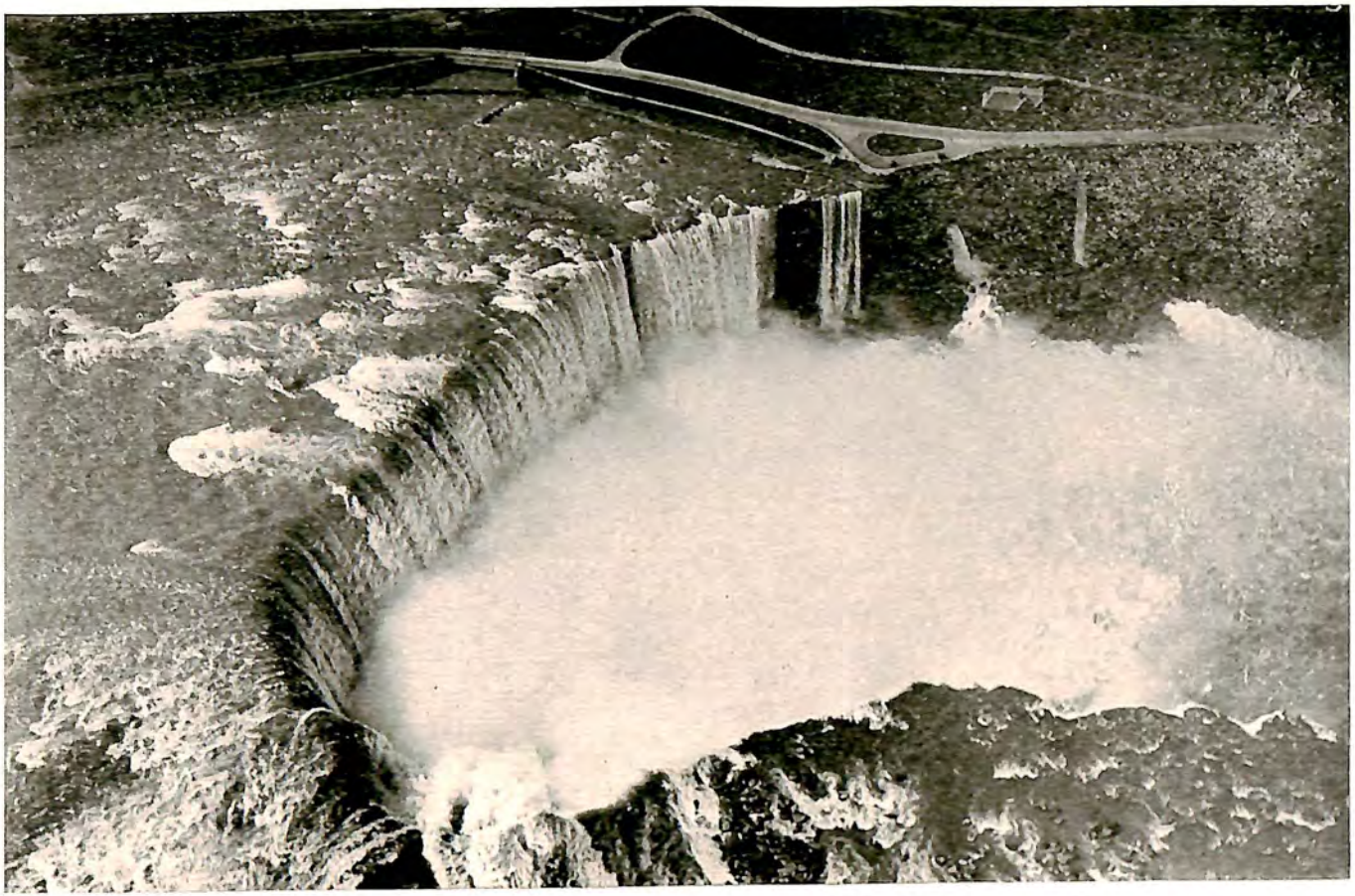
The actual system of navigating by means of the three-mile lights, the long range aerial lighthouses and the field beacons naturally will not be complete in detail until the various pieces of apparatus have been thoroughly tested by the pilots, under working conditions. For example, one of the *AGA* appliances is a ground wind indicator, intended to act as a signal to aviators day and night, and because it is operated by means of the sun valve can be used on fields where no personnel is available. It is built in the form of a T and approximates the standard form internationally agreed upon as an indicator for landing areas. The three parts of the T, or vanes as they are known, are mounted in such a manner as to receive upon their upper surfaces light projected through the dioptric lenses fitted round the beacon head. The vanes and lenses rotate about a vertical axis, thereby swinging with the wind like a weather vane. The long leg of the T is virtually the wind indicator. At night the light can be seen by a pilot twelve miles away.

Another series of demonstrations was being made on the Air Mail experimental field with the lighting apparatus of Barbier, Benard & Turenne, a French company, whose lights include a night landing illuminating apparatus, a 35-mile acetylene beacon and flood and route signal equipment.

Developing New Equipment

Since it started, the Air Mail has been dependent mainly on remodeled DeHavilands, obtained from the surplus stocks of the Army Air Service. Colonel Henderson, sharing with the Chiefs of the Army and Navy aviation services, the conviction that the civilian aircraft industry should be developed, and recognizing also the need for modern equipment in night flying, late in 1922 undertook a series of experiments to secure the best mail plane obtainable. For the present, it was desired to have light weight carrying ships so that the pilots could be broken in on the night flying route; and thereby learn what additional requirements must be given attention. Four aeronautical concerns agreed to provide purely experimental types for the night flying experiments. They were the Aeromarine

The Narrows, Lake George, N. Y., from the air.—Photo, Hamilton Maxwell, Inc.



The magnificent spectacle which Niagara presents from the air.—Photo, Hamilton Maxwell, Inc.

Plane & Motor Company of Keyport, N. J., Curtiss Aeroplane and Motor Corporation of Garden City, N. Y., and the Glenn L. Martin Company of Cleveland, O., and the Roos-Ballanca Aircraft Company at Omaha. Upon the results of the night flying tests with these ships, Air Mail officials planned to design a standard mail plane and to distribute orders throughout the civilian industry.

Steps Toward Private Operation of Air Mail

In his address at the First National Air Institute Colonel Henderson declared:

> "It is my personal opinion that within two or three years the Air Mail Service will have developed to a point where it will undoubtedly be thought wise to turn over the service to private contractors and make it nation-wide in its scope, with higher postage than is now charged on ordinary letters."

The foregoing was also the desire of Colonel Henderson's predecessors, Messrs. Praeger and Shaughnessy. During Mr. Praeger's tenure of office one contract was entered into with Edward Hubbard, of Seattle, Wash., for carrying mail from that city to Victoria, B. C., to connect with outgoing and incoming trans-Pacific mail steamers. Mr. Hubbard's operations have been satisfactory to the Post Office Department and apparently lucrative to himself. The appropriation for foreign mail transportation for 1922 provided that "not to exceed $150,000 . . . . may be expended for carrying foreign mail by aircraft." The Hubbard contract, as now in force, calls for not more than ten round trips per month, the compensation being $200 per trip. The Postmaster General, in his report for the fiscal year 1922, says: "None of the 120 trips scheduled was defaulted, and no accidents occurred in connection with this service. The remarkable achievement of the air mail service during the past fiscal year will, no doubt, offer much encouragement to others interested in air transportation."

In the second half of 1922, additional contracts were entered into with Aeromarine Airways, Inc., of New York City, and Merrill K. Riddick in New Orleans. Aeromarine Airways during the winter months operates a passenger flying boat service between Key West, Fla., and Havana, Cuba. Over this route also they transport considerable quantities of Cuban mail.

The New Orleans service, like that of Seattle, connects continental and ocean mails, saving several days to a fortnight in time, according to sailing dates. Flying boats shuttle between the water front of New Orleans and Quarantine, at the mouth of the Mississippi.

Possibly the most significant feature of the foregoing contracts

with private aircraft operators is that, in each instance, flying is *entirely over the water*—definite indication of the natural development where airways are provided. In the case of over-water flight, airways are provided with continuous emergency alighting space; whereas, in the case of over-land flying severe obstacles are imposed, at the present stage of the art, because of the utter lack of airways and terminals.

Air Mail Contract Bills

The desire of the Post Office Department to serve as a laboratory for the development of civilian mail transportation lines finds its reflection in the ambition of private operators to demonstrate their ability to do the work. This unity of purpose was found, during 1922, to be most welcome to the House Committee on the Post Office and Post Roads. The committee, under the chairmanship of Halvor Steenerson of Minnesota, had approved appropriations which were yearly required for the operation of the Air Mail as an activity of the Post Office Department. It was felt that more definite attempts should be made to interest civilians, thus aiding commerce and relieving the Treasury, and to this end Mr. Steenerson (and subsequently Representative Kelly of Pennsylvania) introduced bills. At the hearings before the committee, an opportunity was presented for representatives of the Post Office Department and the civilian aircraft industry to meet with the committee and express their views fully.

The Steenerson bills (H.R. 9462, H.R. 11193) and the Kelly bill (H.R. 10717)* were similar in general characteristics, the point of difference being the rate at which operators should be compensated.

The Aeronautical Chamber of Commerce, through various officers and members, was represented at the hearings, which were held February 21 and April 28 and 29. Among those appearing were: H. P. French, Netherlands Aircraft Mfg. Co.; C. G. Peterson, Wright Aeronautical Corp.; Clarence D. Hanscom, John M. Larsen, J. L. Aircraft Corp.; Frank H. Russell, Curtiss Aeroplane and Motor Corporation; E. Stockton Martin, National Aircraft Underwriters Association; Frederick B. DeBerard, Merchants Association of New York, and Edward Schildhauer, American Investigation Corp.

The Aeronautical Chamber of Commerce by means of a widely distributed questionnaire ascertained the views of members in various parts of the country and a cross section of these opinions was presented by the Secretary. From many States, and from all elements in civilian aviation, came expressions of appreciation for the

* For text of bills see Air Law Section, Appendix.

preliminary steps taken by Mr. Steenerson's committee. It was pointed out, however, that it would be incorrect to assume the existence of many aerial transportation activities capable of carrying out a mail contract. The survey brought out the declaration that aerial transportation lines, substantially established, must be preceded by Federal Air Law, such as that enacted in every major nation except the United States. Postponement of definite postal contractual legislation was urged until basic Federal legislation could be obtained. The committee then requested the Chamber to endeavor to ascertain the sentiment among municipal Chambers of Commerce, business men, manufacturers, bankers, etc., with regard to general utilization of the Air Mail.

Business Wants the Air Mail

At the hearing on April 29th, the Chamber submitted an analysis of reports from twenty-four Chambers of Commerce and banking organizations from Coast to Coast. The analysis read, in part:

"The reports from the Chambers of Commerce, almost without exception, reveal spirited desire for air mail. This interest is reported as coming from all classes of business, but particularly from banking and financial houses and great concerns having heavy correspondence, the value of which is predicated largely upon the speed of transmission. A demand exists for the air mail along the following routes:

New York to Chicago.
Baltimore to Norfolk, Va.
Omaha, Kansas City, Wichita, Kans., Arkansas City, Kans., to Galveston, Tex.
Chicago to Birmingham, Ala., with spurs to Pensacola, Fla., and Meridian, Miss.
Boston to Richmond, Va., via New York, Philadelphia and Washington.
Boston to Detroit, Mich., via Albany, Syracuse, Rochester, and Bryan, Ohio.
Indianapolis to New York, direct.
Indianapolis to Chicago.
Indianapolis to St. Louis.
Indianapolis to Cleveland.

Kansas City to Chicago.
Kansas City to St. Louis.
Kansas City to New York, direct.

Milwaukee to Detroit.
Milwaukee to Cincinnati.
Milwaukee to St. Louis.

Minneapolis to Duluth.

Rochester to Boston.
Rochester to New York.
Rochester to Albany.
Rochester to Cleveland.
Rochester to Syracuse.

Minneapolis-St. Paul to Lake Charles, La., via Omaha, St. Joseph, Mo., Kansas City, Mo., Nevada, Mo., Joplin, Mo., Ft. Smith, Ark., Texarkana, Ark., Shreveport, La. The incentive is to establish fast north and south connections with Gulf and South American steamship lines.

Los Angeles to San Francisco.
Spokane to Seattle.
Spokane to Portland.

"With the questionnaires submitted to local Chambers of Commerce was an additional sheet concerning the peculiar interest of banking to speeding up in the mails. Time is the genius of the modern banker's business. It has come to the direct knowledge of the Aeronautical Chamber of Commerce that American bankers are manifesting personal interest in the future of aviation and are not only investigating but are themselves making flights.

"In answer to an inquiry, a New York banker said: 'As banking deals almost entirely with interest payments in one form or another and as interest payments depend necessarily upon the time element, it is obvious that time is an extremely important factor. The time of transit of interest bearing paper is important because of the fact that during this time the paper (or rather the capital that it represents) is unavailable and hence unproductive.'

"The establishment of a central gold fund and the practice of daily clearances by telegraph, made possible by the Federal Reserve System, worked a constructive change in our banking methods. Hitherto a check, in order to 'clear' (and the capital be thereby released) had to be transported to the point of delivery and back to the point of origin. Taking New York as typical, prior to the creation of the Federal Reserve machinery, it required four days for clearances between Chicago, Minneapolis, and Jacksonville, whereas it now takes but two; it required six days to New Orleans, Kansas City, and Dallas, and now but three; it required eight days to Denver, Spokane, and Seattle, and now but four; it required ten days to San Francisco and Los Angeles, and now requires but five.

"It is estimated by an official of the Federal Reserve Bank, New York City, that at least $1,000,000,000 in capital is in transit daily in the form of checks. To reduce the clearance time one-half, as was accomplished by the Federal Reserve System, meant a daily release of 50% of this 'float' or $500,000,000, which even in so big a country as ours, is a huge sum.

"The problem now is to make further saving, to tolerate less waste of credit and achieve more speed in clearance. The existing system is predicated upon the fastest surface transportation. It is apparent that there can be no great change until the means of conveyance are improved.

"Here enters the aircraft operator. Airplanes have actually spanned the continent in *thirty-three* hours, and with night flying can do it *in less*. They can today cut down one-half to two-thirds the fastest rail schedules in the country—especially between great banking centers. When this was pointed out to the banker, he exclaimed, 'Why, aircraft will repeat what the Federal Reserve accomplished. By halving the time of transporting checks you will halve the "float"—you will release daily a quarter of a billion dollars which is now unavailable and unproductive while in transit!'

"Elsewhere banking opinion seems to substantiate the assertion just made of the enormous saving possible through the speeding up of clearances. Boston is awake to the possibilities. Birmingham sees in night flying additional credit for the southern and southeastern states. In Buffalo alone almost three-quarters of a million in float would be released daily were the present time of clearance reduced one-half. Cheyenne could save $300,000 and Indianapolis sets its saving at one and three-quarter million dollars a day. Kansas City's figure

is about equal. St. Joseph, Mo., and Spokane, Wash., also see in the reduction of clearance time great potential good.

"Copies of both the Kelly and Steenerson bills were submitted to members of the Aeronautical Chamber of Commerce for comment. Analysis of the written reports shows that the Steenerson bill is generally acceptable provided a flat rate of two mills per pound mile, with a minimum load of 1,000 pounds, is carried, and provided also that the proposal to carry ordinary mail at one-half mill a pound mile is eliminated.

"Most of the operators* with whom the Aeronautical Chamber of Commerce has been in touch assume that a contract rate of two mills per pound mile should be sufficient, provided the operator is not compelled to carry the inequitable charges of terminals, etc., establishment of which is urged as a public duty. There is general recognition that night flying will have to be brought about, and there is evidenced a desire to undertake it. All operators realize that they must provide regular, reliable service, and feel, therefore, that compensation must be sufficient to warrant the outlay necessary to assure dependability.

"Members of the Aeronautical Chamber of Commerce are located in many parts of the United States, and as a result of the present survey it may be specifically stated that operators are interested in undertaking air mail contracts, provided the rate is satisfactory and a pay load is assured, to various points radiating from the following cities: Chicago, Baltimore, Philadelphia, Dayton, New York, St. Louis, Albany, Buffalo, Miles City, Mont., Minneapolis, San Francisco and Los Angeles."

* See C. G. Peterson's paper, Air Institute Section, Appendix.

CHAPTER VI

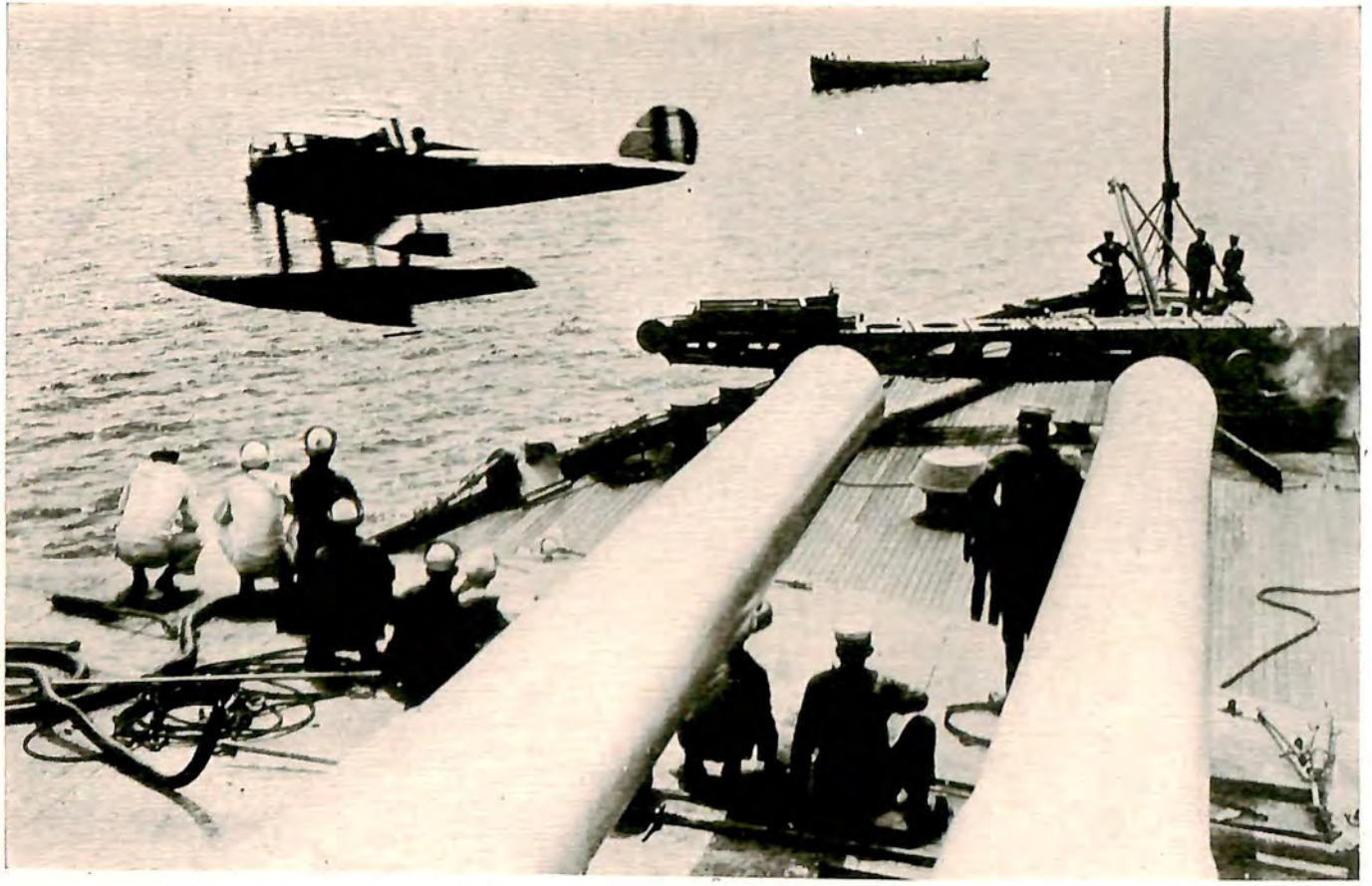
SAFETY IN FLIGHT; LACKING AIR LAW GYPSY CASUALTIES INCREASE; FIXED BASE OPERATORS DEMONSTRATE DEPENDABILITY

IN THE British section of the chapter on World Aeronautics (No. IX), the opinion is expressed by the manager of the Manchester-London-Amsterdam service that fear is the worst obstacle before aviation today.

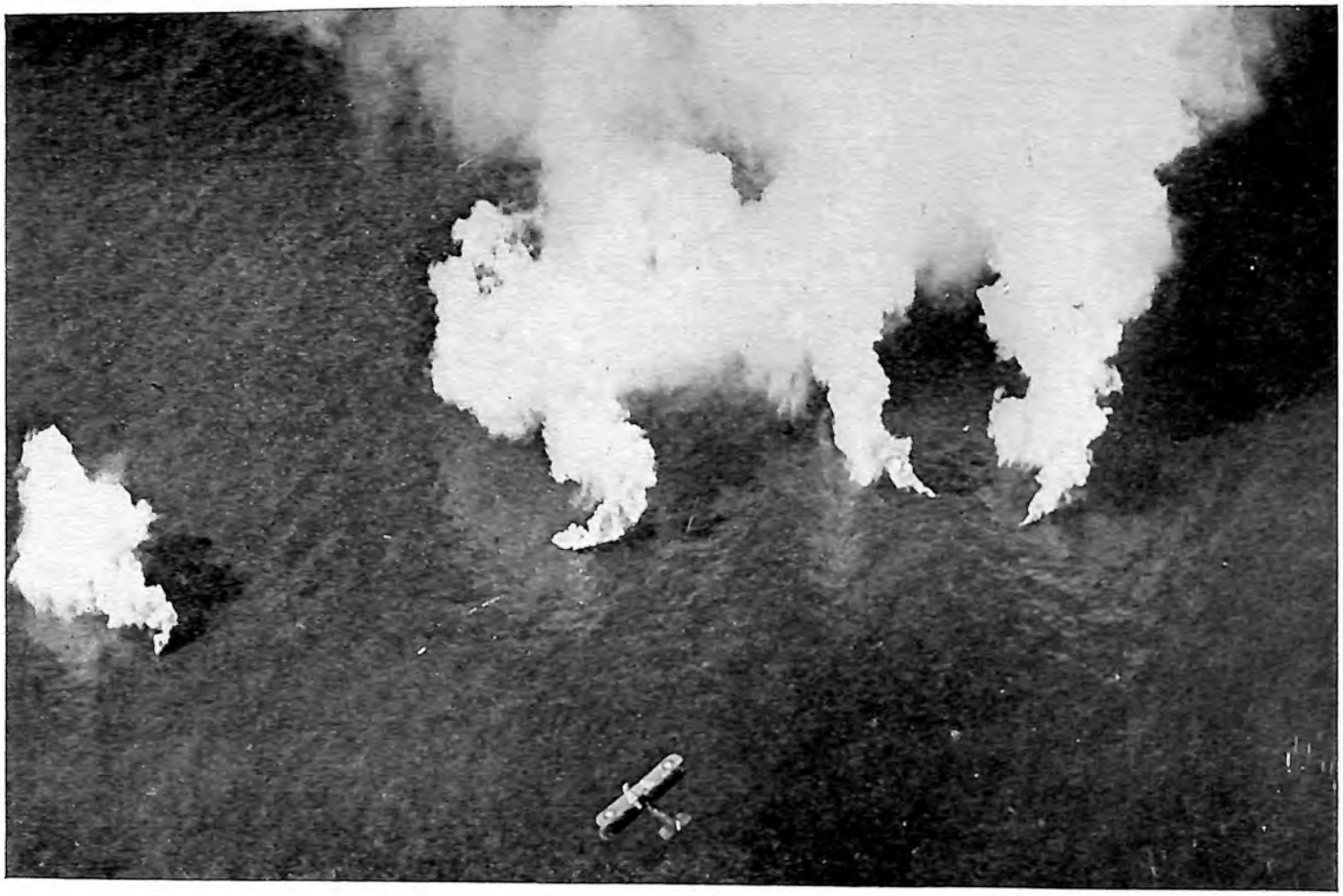
If this is true, explanation of the hesitant attitude shown by the public and capital toward aircraft as common carriers is to be found primarily in the increasing number of accidents among itinerant and irresponsible pilots, and secondarily in the manner in which the press features all accounts of disaster. Until we have Federal Air Law, which will encourage conservative flying and discourage recklessness, and until the newspapers discern that real news is constructive instead of destructive, public and capital will justifiably regard aviation as an experiment.

There is only one corrective for fear and that is demonstration of dependability. In this respect, commercial aviation in the United States during 1922 presented a curious paradox. One hundred and twenty-nine established operators, having definite financial responsibility, flew approximately 600 to 650 aircraft about 2,846,037 miles in the year October 11, 1921-October 11, 1922, with *twelve* serious accidents as compared with *twenty-four* serious accidents in 1921. *Six* fatalities in 1921 were increased to *seven* in 1922, but *twenty-one* injuries in 1921 decreased to but *seven* in 1922. And in 1922, as in 1921, the circumstances attendant upon each fatality were such as to convince the analyst that most of them could have been easily prevented had Federal Air Law been in effect.

In startling contrast is the record of the gypsies. Replacing crashed equipment from the obsolete surplus stores remaining from war production and available at prices so cheap as to tempt youths whose capital was limited to but a few hundred dollars, the number of gypsy planes and mileage flown remained about the same in 1922 as in 1921—550 to 600 craft wandering from town to town for 3,000,000 or less miles. In 1921, according to press accounts, there were 114 accidents involving itinerants; in 1922 there were 126, an increase of *twelve*. These accidents, in 1921, resulted in 49 fatalities



Vought VE-7, Wright E-2 engine, being catapulted off battleship.—Official Photo, U. S. Navy.



Aerial smoke screen blinding dreadnought. An example of how the Navy is developing its third arm.—Official Photo, U. S. Navy.

and 89 injuries; in 1922 they resulted in 62 fatalities and 100 injuries, an *increase of thirteen deaths (or over 26 per cent) and eleven injuries (or over 12 per cent)*.

Six Requisites for Safe Flying

In the report which the Aeronautical Chamber of Commerce made to the Department of Commerce in 1922 were set forth six requisites for safe flying, as follows:

1. A machine, sound aerodynamically and structurally.
2. An engine of sufficient power and which operates satisfactorily.
3. A competent, conservative pilot and navigator.
4. Air ports and emergency landing fields, sufficiently close together to insure gliding to safety.
5. Nation-wide weather forecasts specialized and adapted to the need of fliers.
6. Nation-wide chart of air routes.

It is reasonable to assume that craft and engine will be kept airworthy according to the degree of responsibility, financial or legal, felt by the operator. Likewise the competency of the pilot depends upon either financial liability (for property damage or the loss of his equipment) or legal restraint (imposing disqualification for infraction of regulations). Lacking the latter, the fixed-base operator must not only conduct his own business so as to demonstrate safety, but he also bears the burden of overcoming, as best he may, the cumulative prejudice which the gypsy inspires.

Of the twelve serious accidents occurring in 2,846,037 miles of flying by 129 responsible operators, resulting in seven fatalities and seven injuries, six accidents, entailing five fatalities and three injuries, can be attributed with certainty to causes rather beyond the immediate control of the operator but which would have been removed had some central Federal authority, with power to license fields, craft or pilots, been functioning. It is believed no more than fair, therefore, to reduce the casualty record of fixed-base flying to six accidents, involving death to two people and injury to four, or the following ratio:

One accident	to every 14,989 flights made	or 474,340	miles flown.
One fatality	to every 49,968 flights made	or 1,423,018	miles flown.
One injury	to every 22,484 flights made	or 711,509	miles flown.

Examination of Table No. II discloses some interesting facts. Three of the five fatalities attributed to causes beyond the operators' control occurred at a public field along one side of which were high-tension wires. The field should never have been established there. A pilot took off with three passengers, struck the wires, and his plane crashed in flames. The pilot undoubtedly erred,

TABLE No. II.—SERIOUS ACCIDENTS REPORTED BY 129 ESTABLISHED AIRCRAFT OPERATORS

OCTOBER 1, 1921, TO OCTOBER 1, 1922

(Prepared for the Secretary of Commerce, by the Aeronautical Chamber of Commerce of America, Inc., 501 Fifth Avenue, New York City)

Number	Fatalities	Injuries	Causes											Remarks
			Pilot	Field or Terminal	Lack of Weather Data	Lack of Route Data or Flying Rules	Faulty Craft	Faulty Engine	Faulty Accessory	Stunting	Collision in Air	Carelessness on Field	Unknown	
1		1										1		Crowd on unpoliced field rush out; woman fell in path of plane and was run over.
2		1	1											Seaplane wrecked taking off.
3	3		1	1										Pilot erred; bad air conditions; high tension wires along field; plane hit wires, crashed and burned.
4	1											1		Boy ran into propeller while motor was idling.
5		1										1		Man walked into propeller while motor was idling.
6		1	1	1										Pilot attempted to land in poor field.
7	1				1									Seaplane encountered sudden snow storm; forced landing; craft broke up in hour.
8	1												1	
9		1										1		Spectator usurped plane; attempted flight; crashed.
10		1		1										No field; bad landing.
11	1		1	1								1		Spectator ran in front of plane when pilot landed on public beach.
12		1	1	1										

but the location of the field and the existence of the power lines, turned into a dreadful disaster, witnessed by many thousands of persons, what would otherwise have been a bad landing with more or less serious injury to the occupants.

The other two fatalities were due, one to lack of policing and one to lack of a field. In each case spectators were struck by the propeller. Certainly the pilots bore a share of the blame, but public authority must be held responsible for neglect, just as in the case of a motorist who strikes a pedestrian in a highway along which the public has failed to provide a sidewalk or guard rail.

Two of the three injuries were caused by spectators getting in the way of the machine and the third was due to the theft of a plane by a spectator.

COMPARATIVE TABLE OF SERIOUS ACCIDENTS REPORTED BY 129 ESTABLISHED AIRCRAFT OPERATORS

		1921	1922	*Decrease*	*Increase*
Total number of accidents reported		24	12	12	
Total number of fatalities reported		6	7		1
Total number of injuries reported		21	7	14	
Causes	Pilot	5	5		
	Field or terminal	2	5		3
	Lack of weather data	0	1		1
	Lack of route data or flying rules	1	0	1	
	Faulty craft	1	0	1	
	Faulty engine	3	0	3	
	Faulty accessory	5	0	5	
	Stunting	3	0	3	
	Collision in air	0	0		
	Collision on field	7	5	2	
	Unknown	0	1		1

In the accidents in which the operators may be regarded as culpable, one fatality followed the entrance into a sudden snowstorm of a seaplane and another was due to unknown causes; one of the injuries was caused by poor take-off and two by bad landings (all attributable to the pilot) and the fourth to circumstances unknown. It is possible that, had nation-wide weather reports been circulated by radio, and had the machine been equipped to receive them, the snowstorm might have been circumvented. But even so, the fact that the seaplane broke up in an hour after alighting on the water (the passenger dying from exposure) emphasizes the demand, recognized by designers and builders, for craft strong enough to ride out gales on the earth or water as well as in the air.

In addition to the serious accidents set forth in Table No. II, the established operators, realizing the mutual advantage of exchanging data on all flying difficulties, submitted reports on 59 minor mis-

TABLE No. III.—MINOR ACCIDENTS REPORTED BY 129 ESTABLISHED AIRCRAFT OPERATORS

OCTOBER 1, 1921, TO OCTOBER 1, 1922

(Prepared for the Secretary of Commerce, by the Aeronautical Chamber of Commerce of America, Inc., 501 Fifth Avenue, New York City)

Number	*Causes*											*Remarks*
	Pilot	*Field or Terminal*	*Lack of Weather Data*	*Lack of Route Data or Flying Rules*	*Faulty Craft*	*Faulty Engine*	*Faulty Accessory*	*Stunting*	*Collision in Air*	*Carelessness on Field*	*Unknown*	
1	1											Poor landing on practice hop.
2		1										Seaplane struck submerged log taking off.
3							1					Blew tire taking off.
4		1		1								Landing in strange field after dark.
5		1										Nosed over; soft field.
6		1										Damaged propeller and landing gear.
7		1										Nosed over; soft field.
8	1											Poor take-off.
9	1											Poor take-off; drifted into sign before wheels left ground.
10	1											Student believed to have cut switch believing he was throttling engine.
11							1					Carburetor trouble; machine hit tree in forced landing.
12							1					Air pressure.
13	1	1										
14	1	1										
15					1							Broke shock absorber and plane nosed over.
16		1										Broke lower wings landing in rough field.
17							1					Weak drift wire fitting on seaplane.
18		1										

TABLE No. III.—*Continued*

Number	*Causes*											*Remarks*
	Pilot	*Field or Terminal*	*Lack of Weather Data*	*Lack of Route Data or Flying Rules*	*Faulty Craft*	*Faulty Engine*	*Faulty Accessory*	*Stunting*	*Collision in Air*	*Carelessness on Field*	*Unknown*	
19						1						
20		1										Forced landing in orchard right after taking off.
21	1											Nosed over.
22		1										Landed on race track.
23		1										Landed in high grass and hit hidden post.
24	1											Mechanic failed to tighten spark plugs after cleaning them.
25	1											Pilot ran out of gas and struck tree in landing.
26		1										Field too small for take-off.
27		1										
28	1											
29		1										Seaplane struck submerged rock taking off.
30	1	1										Seaplane wing struck water in short turn to escape trees on take-off.
31		1										Seaplane.
32						1						Seaplane.
33	1	1										Broken landing gear and wing.
34		1										
35	1											Poor judgment; pilot nosed over taking off down steep hill.
36		1		1								Forced landing after dark on unknown field.
37	1						1					Forced landing after dark; due to poor gas and piloting.
38	1						1					Pilot neglected magneto; had forced landing in small field.

TABLE No. III.—*Continued*

Number	Causes											Remarks
	Pilot	*Field or Terminal*	*Lack of Weather Data*	*Lack of Route Data or Flying Rules*	*Faulty Craft*	*Faulty Engine*	*Faulty Accessory*	*Stunting*	*Collision in Air*	*Carelessness on Field*	*Unknown*	
39					1							Faulty elevator control.
40		1					1					Accessory failed; no good landing field available.
41	1											Pilot disobeyed instructions and tested new motor after dark.
42		1										Seaplane struck rock in unfamiliar harbor.
43							1					Poor gasoline caused forced landing.
44	1	1										Seaplane collided with surface craft.
45					1							Same seaplane as Accident No. 54, improperly repaired, crashed.
46	1											Plane overloaded; forced landing.
47	1						1					Plane probably overloaded; carburetor bad; forced landing.
48	1	1										Poor landing field and poor judgment by pilot.
49	1	1										Poor landing field and poor judgment by pilot.
50	1	1										Poor landing field and poor judgment by pilot.
51		1										Broken propeller.
52		1	1	1								Lack of fields, routes and weather data.
53		1	1	1								Lack of fields, routes and weather data.
54		1				1						
55	1	1										
56	1	1					1					Poor judgment, combined with lack of fields.
57	1											Pilot hit tree on landing; plane nosed over.
58	1											Stall on take-off.
59						1						Broken crankshaft over bad country.

When the City of Newark started to develop "Port Newark," the area about the army base, they called on the Aerial Photographer to show its relative location to New York City. This is one of the pictures that answered the purpose.—Photo, Fairchild Aerial Camera Corp.

Those who have motored up the steep grade of Franconia Notch, White Mountains, can appreciate this air view.—Official Photo, U. S. Army Air Service.

haps (involving neither death nor injury) resulting in most instances in only broken landing gear, propeller or torn wing section. The necessity for unfailing vigilance on the part of the pilot is emphasized by the frank admission that, in 26 of the 59 forced landings, the man at the stick was partly or wholly to blame. "Bad judgment" when craft and engine are in good condition did not result disastrously and it is significant to note that, of the 59 mishaps, the airplane was regarded as at fault in but three instances, the engine and its fittings in four, and accessories, gasoline or oil, in ten. The trouble attributed to the latter suggests the necessity for improved distribution of parts and supplies, so necessary for inter-city flights, and essentially dependent upon the development of a nation-wide scheme of air routes and terminals. The fact that in 32 of the mishaps inadequate field or terminal facilities was responsible is further proof of the statement that air transportation cannot expand until the proper ground organization *outside the home stations of the fixed-base operators* is established. Lack of weather or route data did not seem responsible for much trouble, the number of minor landings due to these causes being two and four, respectively. It is encouraging that neither stunting nor "unknown cause" is given as the reasons for any crash. The inference is that the fixed-base operator performs aerobatics only at the proper height and within reason. And, if he has a forced landing he makes every effort to find out what caused it.

Itinerant Flying Increasingly Dangerous

In examining the record of the itinerant fliers, the following summary, comparing 1922 with 1921, shows how increasingly dangerous unregulated, gypsy performance has become:

	1921	*1922*	*Increase*
Total number of gypsy accidents recorded	114	126	12
Total number of fatalities	49	62	13
Total number of injuries	89	100	11

Gypsy accidents due to following combination of causes

	1921	*1922*	*Increase*	*Decrease*
Piloting	49	46		3
Poor fields or lack of them	20	14		6
Lack of weather data	4	1		3
Lack of route data or flying rules	10	9		1
Inspection: Faulty craft	4	22	18	
Inspection: Faulty engine or fitting	9	11	2	
Inspection: Faulty accessory	9	4		5
Stunting	29	39	10	
Collision in air	2	0		2
Carelessness on field	8	11	3	
Unknown	8	17	9	

An established operator expressed the opinion that, even at his field, where every effort is made to maintain rigid discipline, the pilot was to blame in most mishaps. "There exists," said he, "a very great need for incentive to safety other than natural caution on the part of the flier. Fearlessness of consequences, inspired during the war, persists in most pilots today as a readiness to 'take a chance.' This not unnatural inclination is nourished by the unfortunate attitude of the public. Exhibition stunt flying, as distinguished from test or practice aerobatics, thrives principally because someone somewhere is willing to pay a thoughtless youth liberally for performing. Yet when, in the course of such performance, the youth meets disaster, the same public which tempted him by 'big money' disavows reponsibility and not only the trick flier suffers but all aviation as well. Corrective and restrictive legislation is needed, but that is not all. The gypsy is, after all, an ambitious lad who utilizes such advantages as appear, and if state and county fairs or municipal chambers of commerce were to offer prizes and honors for performances in safety and efficiency, instead of speed and thrills, scores of unfortunate lads, and not a few young women, would be alive today and the entire flying business would be much further advanced."

This thought finds substantiation in the facts. In 46, or more than 36 per cent, of the itinerant accidents, the pilot was found to be to blame. In 39 accidents, or about 30 per cent, stunting was involved. And in 37 accidents, or more than 29 per cent, some part of the flying equipment—craft, engine or accessory—was unquestionably at fault. Thus, at a glance, is seen vivid proof of the arguments which have been advanced for the last four years that Federal regulation, providing primarily for the licensing of pilots as to competency; the prohibition of dangerous flying; and for the certification of equipment as to airworthiness will operate to correct abuses in aviation, and make safe flying safer.

Many Contributory Causes

In accidents occurring among itinerant fliers it is difficult always to state with certainty any one specific cause. Generally two or more causes are directly contributory. It is the nature of the gypsy to be irresponsible. It is natural that he should willingly perform the *kind* of flying (stunts) for which he is most liberally paid and it is inevitable that, hopping from point to point, here today and gone tomorrow, his craft should deteriorate rapidly and consequently be in constant danger of fault or failure.

Of the 126 accidents, 50 resulted in injury to one or more persons and 42 caused death to one or more and injury to others. In

TABLE No. IV.—ACCIDENTS RECORDED IN PRESS, AS OCCURRING AMONG ITINERANT OR GYPSY FLIERS

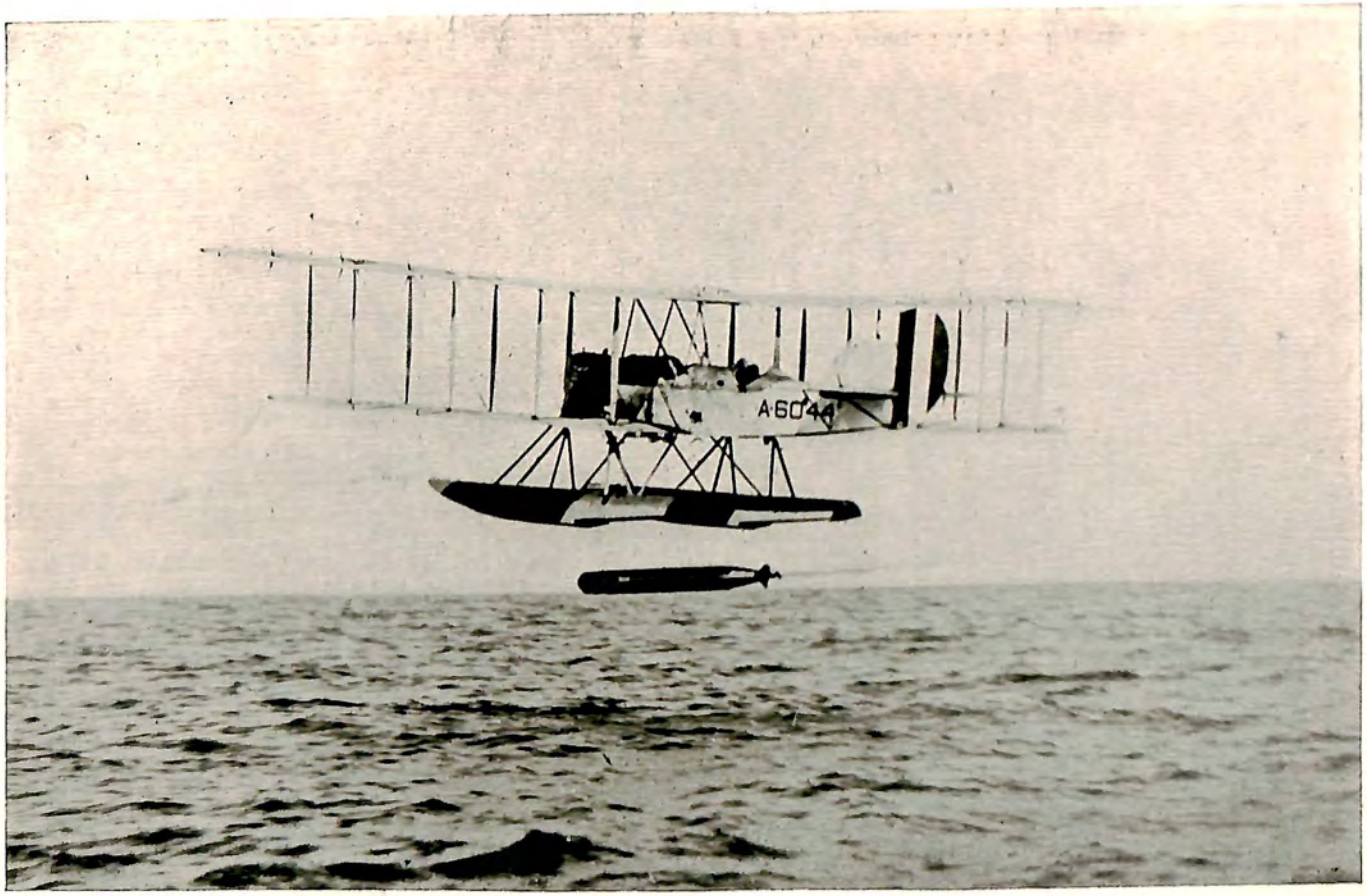
JANUARY 1 TO DECEMBER 31, 1922

(Prepared for the Secretary of Commerce, by the Aeronautical Chamber of Commerce of America, Inc., 501 Fifth Avenue, New York City)

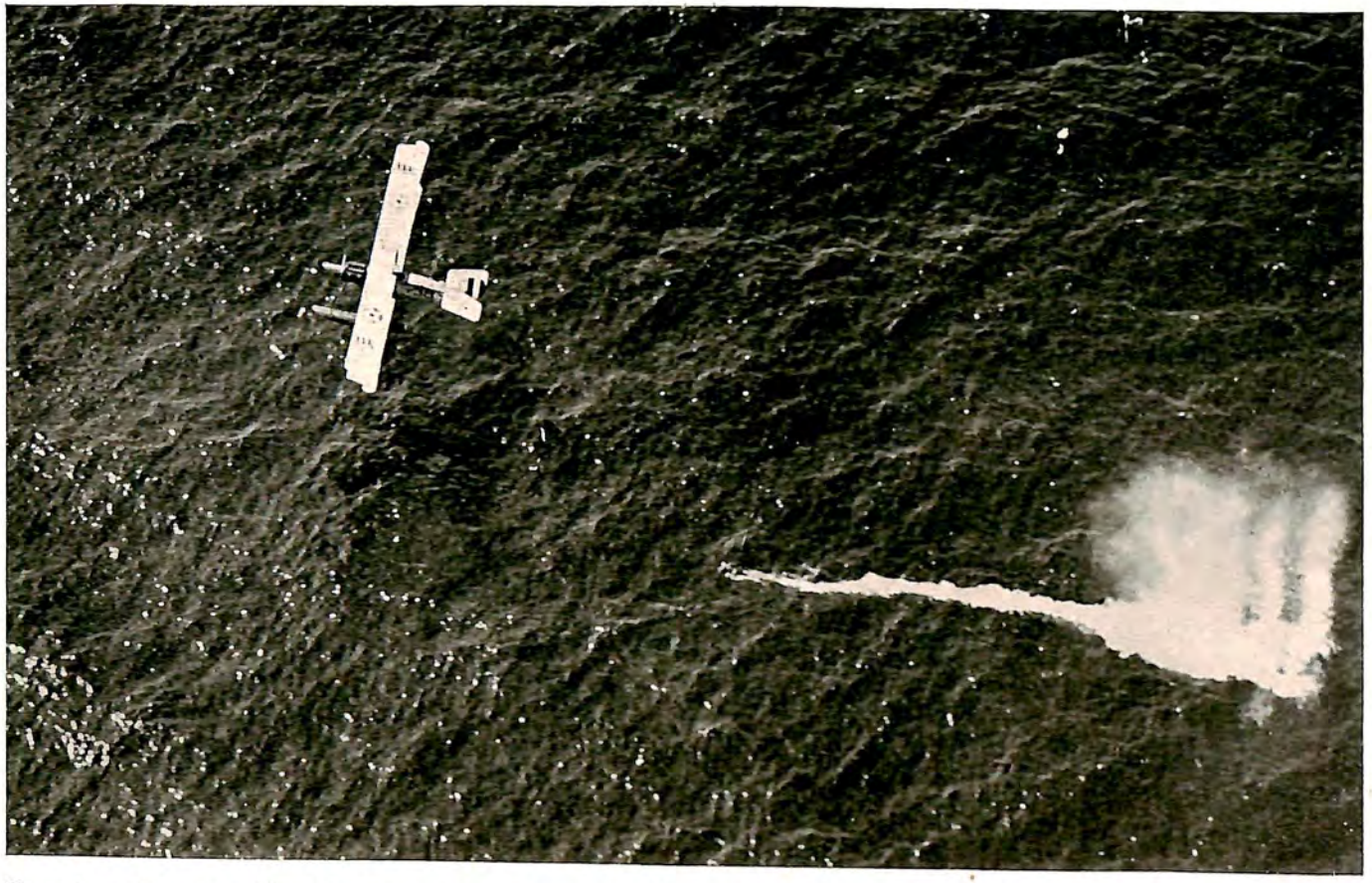
Number	Date	Locality	Killed	Injured	Causes											Remarks
					Pilot	Field	Lack of Weather Data	Lack of Route Data or Flying Rules	Faulty Craft	Faulty Engine	Faulty Accessory	Stunting	Collision in Air	Carelessness on Field	Unknown	
	1922															
1	Jan. 15	Red Bank, N. J.....	1	1	1	1										Pilot utilizes ice-covered Shrewsbury River as landing field. River covered with skaters. Pilot starts engine. Plane leaps blocks and plows into crowd, killing woman, maiming man and knocking down a score of other spectators. Plane said to have been "home-made." Fliers then barred from river.
2	Jan. 16	Guthrie, Okla.	1	1	1			1								Student "froze" to controls, causing plane to crash. No communication tube installed for communication between instructor and student. Attributed partly to pilot and partly to lack of rules governing instruction.
3	Jan. 21	Mendocino, Cal.	1									1				"Dare-devil" parachute jumper killed in sight of 3,000 spectators gathered to witness stunt aviation performance. Aviator loses grip on parachute.
4	Jan. 30	Tombstone, Ariz.			1											Student pilot cracks up plane in attempted flight after only three hours instruction.
5	Feb. 22	San Jose, Cal.....	1									1				Specialist in wing-walking, changing planes, etc., falls 2,700 feet to death before 20,000 spectators at air circus when parachute fails to open.
6	Mar. 3	Bakersfield, Cal.		2		1										Probably insufficient field facilities. Pilot credited with skill avoiding houses and wires; engine stopped immediately after taking off.
7	Mar. 4	San Pedro, Cal.....			1							1				Girl stunt flier cracks plane in bad landing.
8	Mar. 4	San Diego, Cal.....		1								1		1		Stunt flier after performing with partner, lying handcuffed across engine of plane, runs down spectator on landing in park. Spectator gets in path of plane trying to take picture; possibly fatally hurt.
9	Mar. 20	Dallas, Tex.	1	1	1	1										Pilot in attempting to land, strikes smokestack and crashes.

TABLE No. IV.—*Continued*

Number	Date	Locality	Killed	Injured	Causes											Remarks
					Pilot	Field	Lack of Weather Data	Lack of Route Data or Flying Rules	Faulty Craft	Faulty Engine	Faulty Accessory	Stunting	Collision in Air	Carelessness on Field	Unknown	
10	Mar.22-24	Miami, Fla.	5	1	1			1	1							Gypsy flier, with seaplane that had lain exposed on beach for season, and which was not in condition to fly, takes 5 persons, 3 women and 2 men, as passengers for flight to Bimini. Propeller breaks and for two days plane drifts. Five passengers washed overboard and lost. Pilot alone saved.
11	Mar. 31	Macon, Ga.	2	1	1	1										Plane crashes into high smokestack.
12	Apr. 9	Fresno, Cal.	1	1								1				Stunt flying meet, attended by 10,000 persons ends in crash fatal to passenger. Pilot performing acrobatics; declares plane refused to come out of tail spin.
13	Apr. 16	Fresno, Cal.										1				"Upside down" stunt flier fails to right plane in time and makes forced landing.
14	Apr. 16	Sacramento, Cal.	1									1				"Dare-devil" performer loses grip on landing gear of stunting plane and falls 150 feet to death in sight of thousands of spectators.
15	Apr. 20	Sacramento, Cal.		1							1					Owner of plane figuring in preceding accident injured when propeller breaks on landing.
16	Apr. 23	Hatboro, Pa.	2												1	Pilot and passenger perish when plane bursts into flames while in flight and crashes.
17	Apr. 25	Guttenburg, N. J.....		2						1						Owner of plane and passenger injured in crash due to engine trouble. Indications are inspection would have revealed fault before flight.
18	May 3	David City, Neb.....	2						1			1				Stunt pilot and mechanic killed in crash after wing collapses when plane is in loop.
19	May 12	Los Angeles, Cal.....		2	1											"Joy riders" run out of gas. Attempt to land and alight on high tension wires.
20	May 15	New York													1	Aerial bootlegger carrying whiskey cargo from Canada crashes in hills while circling for rendezvous with motorists.
21	May 21	San Francisco, Cal.....	1									1				"Dare-devil" performer featured in Fresno, Cal., circus of April 9th, which ended in fatality of passenger, is himself killed in parachute leap.
22	May 21	Moline, Ill.		2	1	1										Passenger carrying plane makes bad landing, presumably due to poor piloting or field.



Launching torpedo from Seaplane in first practice of kind in history of U. S. Navy, Sept. 27, 1922.—Official Photo, U. S. Navy.



Torpedo under way. Twenty planes of torpedo and bombing squadron No. 1, Atlantic Fleet, participated in maneuvers.—Official Photo, U. S. Navy.

TABLE No. IV.—*Continued*

Number	Date	Locality	Killed	Injured	Causes											Remarks
					Pilot	Field	Lack of Weather Data	Lack of Route Data or Flying Rules	Faulty Craft	Faulty Engine	Faulty Accessory	Stunting	Collision in Air	Carelessness on Field	Unknown	
23	May 21	Galveston, Texas	1	1	1	1						1				Army salvage ship rebuilt apparently by inexperienced persons. Pilot killed, passenger hurt in "diving" at spectators to frighten them. Plane catches fire on crashing. Field faulty; one-way approach.
24	May 27	Dallas, Texas		1								1				"Dare-devil" performer falls head-first from top wing of looping plane into cockpit, jamming controls, causing plane to fall 1,300 feet. Pilot rights it barely in time to avert crash. Great crowd witnesses incident.
25	June 4	Lincoln, Neb.		1	1							1				Stunt flier fails to come out of a barrel roll and tail spin.
26	June 4	Wooster, Ohio		1	1							1				Stunt flier falls into lake; makes too low a spin.
27	June 6	Santa Ana, Cal.....	1	1								1			1	Both victims said to have been stunt performers. Owner of field where accident occurred attributes it to "stunt flying at too low altitude."
28	June 7	Chicago, Ill.			1											Seaplane runs out of gas and is marooned four miles out in Lake Michigan.
29	June 9	Dorchester, Mass		2	1	1										Pilot wrecks seaplane taking off in order to avoid bathers on beach.
30	June 10	New York			1											Pilot runs out of gas; uses low test; wrecks plane.
31	June 11	Los Angeles, Cal.....	1	2	1			1								Accident said to have been caused by circulars, dropped from plane, lodging in elevator, jamming controls.
32	June 11	Chicago, Ill.	2	1	1											Gypsy flier says controls stuck; reported plane designed to hold two persons carried three on fatal trip. Stall on turn one cause given. Coroner's jury returns verdict urgently recommending rigid governmental inspection of planes and licensing of pilots.
33	June 13	Kansas City, Mo.....			1					1						Circumstances indicate inspection would have caused postponement of flight until new engine had been installed.
34	June 13	Helena, Mont.							1							Circumstances indicate inspection would have revealed weakness in landing gear which caused crash.

TABLE No. IV.—*Continued*

Number	Date	Locality	Killed	Injured	Causes											Remarks
					Pilot	Field	Lack of Weather Data	Lack of Route Data or Flying Rules	Faulty Craft	Faulty Engine	Faulty Accessory	Stunting	Collision in Air	Carelessness on Field	Unknown	
35	June 14	Gloucester, Mass.								1						Engine failure causes crash; lack of inspection indicated. Wreck sold to amateurs, indicating need for control.
36	June 18	Chicago, Ill.		1										1		Mechanician for pilot of plane in which two were killed June 11th injured when struck by propeller.
37	June 19	Shawneetown, Ill.		1								1				Plane falls while looping.
38	June 19	Wheaton, Ill.		1	1				1					1		"Home-made" plane wrecked when pilot tries to land on field crowded with spectators.
39	June 19	Reno, Nev.						1	1							Stunt fliers lose way and make bad landing.
40	June 22	Carmi, Ill.		1								1				Stunt flier loses control of plane; falls 1,000 feet.
41	June 24	Vallejo, Cal.	2						1							Pilot and student passenger killed; controls may have been jammed.
42	June 26	Los Angeles, Cal.			1							1				Low flying stunt performer collides with motor car. Women in car suffer from shock.
43	June 26	Asbury Park, N. J.....		1											1	Wrecked in landing; probably poor piloting.
44	June 29	Kokomo, Ind.	1							1					1	Possibly faulty engine.
45	July 2	Rockford, Ill.							1							Plane rebuilt by amateur mechanic.
46	July 2	Chicago, Ill.	1									1				"Dare-devil" performer, changing planes in mid-air, thrown into propeller. Accident witnessed by huge throng.
47	July 4	Chicago, Ill.	1											1		On closing day of meet at which previous accident occurred crowd rushes on to field and boy steps into whirling propeller of plane just landed. Coroner denounces stunt flying and carelessness.
48	July 4	Asbury Park, N. J.....		1								1				"Dare-devil" performer dives from plane into sea.
49	July 4	Hamlin, Ark.							1							Widely advertised political campaign by air ends in crash. Plane said to have been Army salvage.
50	July 4	Aberdeen, Wash.	1			1										Passenger drowned trying to reach seaplane where no terminal facilities existed. A few days later plane itself is wrecked.
51	July 4	Dansville, N. Y.....		1								1				Parachute catches fire; stunt performer falls into tree.
52	July 5	Puebla, Mex.	1	1								1				Passenger killed; pilot injured; pilot an associate of stunt performer who was killed in San Francisco, May 21st.

TABLE No. IV.—*Continued*

Number	Date	Locality	Killed	Injured	Causes											Remarks
					Pilot	Field	Lack of Weather Data	Lack of Route Data or Flying Rules	Faulty Craft	Faulty Engine	Faulty Accessory	Stunting	Collision in Air	Carelessness on Field	Unknown	
53	July 9	Pittsfield, Mass.			1				1							Plane lands upside down in river. Due either to deficient plane or incompetent pilot.
54	July 9	Pasadena, Cal.	1		1	1										Pilot attempts to land on beach. Bathers scattered and one is killed. Jury acquits pilot, but accident emphasizes need for field and warning signals.
55	July 12	Atlantic City, N. J....			1											Pilot runs out of gas over city; crashes plane in inlet.
56	July 13	South Durham, Ill....						1		1						Lack of route data; pilot loses way; plane crashes.
57	July 13	Lake Geneva, Wis.....		1								1				"Dare-devil" performer on rope ladder from seaplane jumps from plane and lands in tree. Large crowd witnesses stunts.
58	July 13	Broadview, Mont.							1	1						Plane said to have been "home-made."
59	July 14	Spencer, W. Va.....	1										1			Passenger alighting from plane walks into propeller.
60	July 16	Los Angeles, Cal.....	3									1				Wings reported to have collapsed while plane is looping; wreckage catches fire.
61	July 16	Wichita, Kan.		1								1				"Dare-devil" performer thrown from wing into cockpit on to pilot. Experience later advertised to put "punch" into aerial circus at Topeka.
62	July 16	Tuscola, Ill.		2	1					1						Probably lack of inspection. Pilot said to be flying too low.
63	July 19	Celina, O.		3				1								Passenger puts foot on rudder of dual control plane, thus throwing plane out of control.
64	July 23	McComb, Ill.		2	1											Three-year-old plane goes into spin.
65	July 23	Framingham, Mass. ...	1	2	1				1							Plane said to have been overloaded. Crash occurs at start of transcontinental flight.
66	July 24	Washington, D. C.....	1		1				1			1				Gypsy flier's plane crashes. Same pilot on May 30th flew so low over throng at Lincoln Memorial Dedication that president's speech was interrupted and many spectators frightened. Pilot publicly "censured."
67	July 24	Ft. Wayne, Ind.....			1	1										Field in city; pilot, taking off, attempts to zoom over street; plane crashes on to power line and ignites.
68	July 30	Greenville, Ill.	1	1	1											First flight fatal to pilot. Apparently mechanic had "taught" him.

TABLE No. IV.—*Continued*

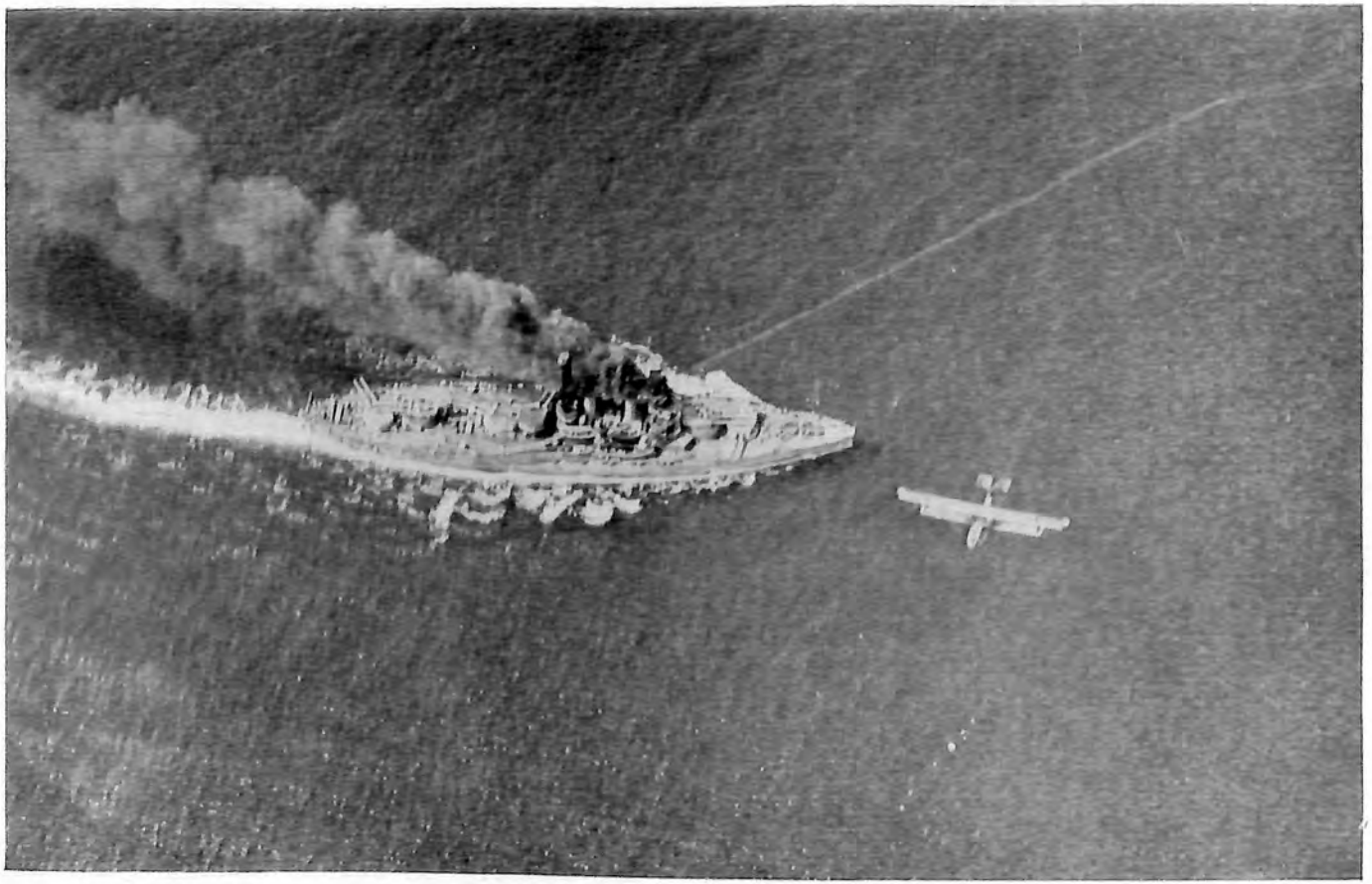
Number	Date	Locality	Killed	Injured	Causes											Remarks
					Pilot	Field	Lack of Weather Data	Lack of Route Data or Flying Rules	Faulty Craft	Faulty Engine	Faulty Accessory	Stunting	Collision in Air	Carelessness on Field	Unknown	
69	July 30	Kansas City, Mo.....		1										1		Motorist parks car on field and plane, in taking off, hits it.
70	July 31	Hyde Park, Cal.....		1								1				Stunt flier "thrilling" spectators in streets, strikes roof of building and crashes.
71	Aug. 2	Sandusky, O.			1										1	Seaplane advertised as "taxi" plunges into lake. Probably poor piloting.
72	Aug. 2	South Chicago, Ill.....	1											1		Pilot hit by propeller.
73	Aug. 4	Broadview, Mont.			1				1							Pilot, flying too low, strikes a mountain.
74	Aug. 5	Detroit, Mich.		2							1	1				Stunt flier falls when turnbuckle breaks under excessive strain.
75	Aug. 6	Chicago, Ill.		2	1											Plane said to have failed to respond to controls.
76	Aug. 6	Lake Geneva, Wis.....					1									Plane caught in severe storm; crashes in marsh.
77	Aug. 10	Naperville, Ill.	2								1				1	Plane plunges from 1,000 feet altitude and burns. Control wires may have been defective.
78	Aug. 13	Medina, Ohio	2		1											Student aviator probably jams controls.
79	Aug. 13	Detroit, Mich.		5					1							Rebuilt German war machine.
80	Aug. 17	Alliance, Ohio									1					Crash due to impure or low test fuel.
81	Aug. 18	Lincoln, Neb.		1								1				Plane crashes when stunt flier is flying upside down.
82	Aug. 18	Atlantic City, N. J....		2	1											Probably due to inexperienced operators who took machine up for "joy ride" without permission.
83	Aug. 18	Hoboken, N. J.....			1											Plane runs out of gasoline over city. Lands few feet from path of express train.
84	Aug. 19	Grand Rapids, Mich...		2	1				1							Question as to piloting and condition of "rebuilt" plane.
85	Aug. 20	Greenport, L. I., N. Y.		2											1	Plane said to have been Army salvage.
86	Aug. 21	Hasbrouck Heights, N. J.		3	1											Plane hits roof of building in taking off.
87	Aug. 22	Porterville, Cal.		2											1	Woman stunt performer and pilot injured.
88	Aug. 25	Steubenville, Ohio		1					1							Unsafe plane. Wing drops off just after plane leaves ground.
89	Aug. 25	Denver, Colo.							1							Control wires break. Plane said to have been old European military type.
90	Aug. 26	Atlantic City, N. J....			1					1						Pilot flying very low over city strikes high tension wires. Three aviators thrown into water. Bridge traffic demoralized.
91	Aug. 28	Antioch, Ill.		1									1			Pilot breaks leg when turning over propeller.

TABLE No. IV.—*Continued*

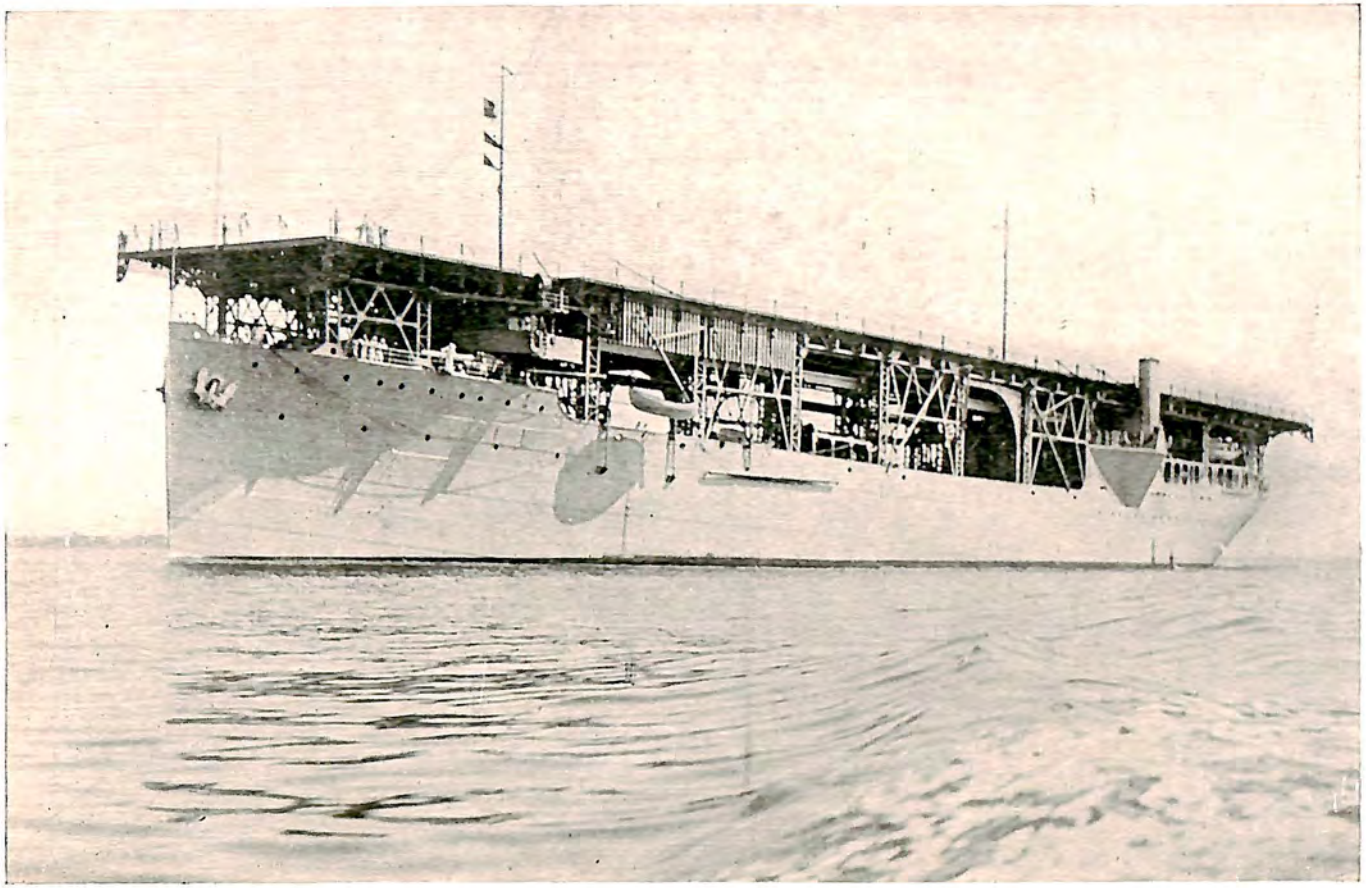
Number	Date	Locality	Killed	Injured	Causes											Remarks
					Pilot	Field	Lack of Weather Data	Lack of Route Data or Flying Rules	Faulty Craft	Faulty Engine	Faulty Accessory	Stunting	Collision in Air	Carelessness on Field	Unknown	
92	Aug. 30	Spokane, Wash								1		1				Stunt flier thrills city by flying between business buildings. Engine stops; plane crashes in river.
93	Aug. 31	Des Moines, Iowa.....		2											1	Probably bad take-off.
94	Sept. 1	Hawarden, Iowa			1							1				Aerial acrobats on way to keep engagement. Pilot becomes ill and plane crashes.
95	Sept. 2	Sumpter, S. C.....	3												1	Accident actually occurred in April; did not come to notice until September 2d. Fire followed crash.
96	Sept. 3	Chatsworth, Ill.			1											Probably poor piloting. Reported to be second plane demolished by pilot.
97	Sept. 4	Miami, Fla.		2											1	
98	Sept. 4	Evanston, Ill.	1	1								1				Five thousand people witness crash following "exhibition" flying.
99	Sept. 5	Evanston, Ill.		1								1				"Dare-devil" performer injured in parachute leap at air circus.
100	Sept. 7	Rutland, Vt.	4		1				1			1				Lieut. B. W. Maynard, one of best known pilots and two others killed in stunt. Machine was European military type. Had been crashed three times. Rebuilt by men declared not competent, and altered, it is alleged, thus affecting vital members. Alleged Maynard never flew plane until day or two previous. Immediately after crash "Dare-devil" parachute performer killed when appliance failed to open.
101	Sept. 7	Cedar Rapids, Iowa...		2								1				Disastrous crash ends stunt performance.
102	Sept. 8	Fond du Lac, Wis.....		2	1							1				Student pilot tries to stunt at low altitude.
103	Sept. 10	San Antonio, Tex.....	1	2		1										Reports indicate pilot attempted to turn back when motor cut out, taking off, and plane sideslipped.
104	Sept. 10	Jackson, Mich.		2		1										Air tourists, incorrectly informed as to landing facilities, crash plane on house, knocking over chimney and punching hole in roof.
105	Sept. 12	Tulsa, Okla.	2												1	
106	Sept. 15	Davenport, Iowa			1			1								Pilot who had not completed training loses way. Crashes plane on haystack after dark.
107	Sept. 17	New York								1						Motor goes dead and plane plunges into Lower Bay.

TABLE No. IV.—*Continued*

Number	Date	Locality	Killed	Injured	Causes											Remarks
					Pilot	Field	Lack of Weather Data	Lack of Route Data or Flying Rules	Faulty Craft	Faulty Engine	Faulty Accessory	Stunting	Collision in Air	Carelessness on Field	Unknown	
108	Sept. 18	Hampshire, Ill.		1										1		Man knocked down by propeller.
109	Sept. 18	Flagstaff, Ariz.							1							Ex-Navy man purchases Army salvage plane and motor failure forces landing on railroad tracks.
110	Sept. 22	New York		1								1				"Dare-devil" performer makes 1,000 feet parachute drop head first into Hudson River at night.
111	Sept. 23	Springfield, Ohio		2	1					1						
112	Sept. 27	San Francisco, Cal.....		1										1		Struck by propeller.
113	Sept. 30	Mt. Vernon, Ohio.....	2												1	Gypsy flier and passenger. Reports indicate motor not functioning properly.
114	Oct. 1	Decatur, Ill.		1		1										Lack of proper field.
115	Oct. 2	Chicago, Ill.		1				1								Reports allege aviators endangered motorists before seaplane plunged into lake.
116	Oct. 7	Bellefontaine, Ohio ...		1					1						1	Cause in question. Said to have been testing new plane.
117	Oct. 8	Spring Lake, N. J.....							1							Control wire said to have broken while seaplane was flying at very high speed.
118	Oct. 13	Cleveland, O.	1									1				Girl stunt performer, hanging to rope ladder attached to plane, dragged to death when craft lands.
119	Oct. 26	Okeechobee, Fla.	1	1	1			1								Plane crashes in city street.
120	Oct. 29	Lansing, Mich.			1				1							Seaplane out of control. Pilot lands it in field.
121	Oct. 29	Alton, Ill.				1										Attempt to take off on insufficient field.
122	Oct. 29	Davenport, Iowa												1		Engine started when plane is not blocked. Mechanics turn it in time to save spectators and it crashes into another on field.
123	Nov. 12	New York		2								1				Stunts with seaplane end in crash that imperils marine traffic in North River.
124	Nov. 26	Salina, Kan.	2	1											1	
125	Dec. 22	Riverside, Cal.		2								1				Stunt performers badly hurt attempting to change from plane to moving train.
126	Dec. 31	Mexia, Texas	1	1											1	Reported nose-dive.



Torpedo making hit; seventeen torpedoes were launched and seven fatal hits on battleships scored.—Official Photo, U. S. Navy.



U. S. S. "*Langley*," America's first aircraft carrier.—Official Photo, U. S. Navy.

COMPARATIVE RECAPITULATION—

	1921	1922	Increase in 1922
Accidents	114	126	12
Fatalities	49	62	13
Injuries	89	100	11

COMPARATIVE RECAPITULATION—BY MONTHS—

	1921	1922
January	2	4
February	1	1
March	2	6
April	6	6
May	16	7
June	13	20
July	13	26
August	28	24
September	16	20
October	8	9
November	8	2
December	1	2
	114	126

COMPARATIVE RECAPITULATION—BY STATES—

EASTERN:

	1921	1922		
Alabama	1	0		
Connecticut	1	0		
District of Columbia	1	1		
Florida	1	3		
Georgia	1	1		
Massachusetts	2	4		
New Jersey	10	10		
New York	7	7		
Pennsylvania	4	1		
South Carolina	0	1		
Vermont	0	1		
Virginia	2	0		
	30	29	30	29

COMPARATIVE RECAPITULATION—*Continued*

MIDDLE WESTERN:

	1921	1922		
Arkansas	0	1		
Colorado	1	1		
Illinois	9	25		
Indiana	2	2		
Iowa	7	5		
Kansas	0	2		
Kentucky	1	0		
Louisiana	1	0		
Michigan	3	5		
Minnesota	5	0		
Missouri	0	2		
Nebraska	4	3		
Ohio	1	10		
Oklahoma	2	2		
Tennessee	1	0		
Texas	2	5		
West Virginia	0	1		
Wisconsin	4	3		
	43	67	43	67

FAR WESTERN:

	1921	1922		
Arizona	1	2		
California	15	21		
Idaho	5	0		
Montana	5	3		
Nevada	0	1		
New Mexico	2	0		
Oregon	4	0		
Washington	9	2		
	41	29	41	29
Mexico		1		1
			114	126

the 42 fatal accidents, responsibility would seem to be as follows: Pilot 14, field 7, weather 0, route data 4, craft 5, engine 2, accessory 1, stunting 15, collision 0, carelessness on field 3, unknown 8. In the 50 accidents causing injury only, responsibility combined as follows: Pilot 24, field 11, weather 0, route data 6, craft 7, engine 3, accessory 2, stunting 24, collision 0, carelessness on field 7, unknown 9.

Table No. IV lists chronologically the accidents recorded by the press as occurring among itinerant fliers during the calendar year 1922. It is an alarming account. Explanatory remarks throw clear light on the deadly nature of stunt flying, for performers, starting out in January, are reported, one by one, to have met with disaster or death. Pursuit of the dare-devil, the death-wing dancer, the aerialist holds a morbid fascination. There are accounts of "home-made" or remodeled planes, students who set themselves up as "common carriers" before they really know how to fly, pilots who swoop down upon bathing beaches and picnic grounds, and equally foolish spectators who pay for curiosity with their lives by running in the path of a machine or walking into a whirling propeller.

In examining the press accounts of many of these accidents violent reaction in the public mind is apparent. The wandering aviator appears. Picturesque, still unique, something of a poser, he attracts attention in the same manner that a motorist attracted attention in the days when it was quite the thing to wear bizarre caps, goggles, gauntlets and linen duster. For some days he lives up to expectations—possibly long enough to enable him to fill his contract or give all the curious a hop and get safely away—but not infrequently the scene of his triumphs is also the scene of his downfall. And the public, which in its primitive desire for a thrill has not changed greatly in ages, is horrified at the result of that for which their own encouragement was largely responsible.

When the Gypsy Crashes

Space does not permit discussion of more than three or four of the accidents recorded in Table No. IV. In thirteen instances two or more lives were lost under conditions sufficiently spectacular to command front page space in every newspaper throughout the country. There was the incident at Miami, Fla., in March when an itinerant pilot set himself up in air transportation in competition with established operators who had not had a serious mishap in a million miles flying, extending over a period of three years. This pilot, with a seaplane which had lain for months on the beach exposed to wave and weather, sold passage to five people and started for the island of Bimini, some 45 miles distant. Forced down in a storm, all the

five passengers were swept to their death and the pilot was rescued only after three and a half days during which he clung to the wrecked hull of his plane. The result of this disaster was to confuse the gypsy with the trustworthy operator and consequently to do intense harm to all aviation.

Other particularly distressing crashes were at Macon, Ga., where a plane was guided by a blundering pilot into a smokestack; at David City, Neb., where pilot and mechanic perished when a wing collapsed during stunts; at Chicago, where three persons were loaded into a plane designed to carry but two; at Vallejo, Cal., where student jammed controls; at Los Angeles, where a stunting plane collapsed and burst into flames; at Sumter, S. C., where fire followed crash; at Tulsa, Okla., Mt. Vernon, O., and Rutland, Vt.

At Rutland four persons perished; one of them was Lieut. B. W. Maynard, "the Flying Parson," nationally known as a safe and expert pilot. Maynard was not a gypsy. He was a fixed-base operator who, to oblige an acquaintance, left his own field and equipment in New York for a day to fill a stunt engagement. Maynard and two others were killed. Exactly what happened could not be learned, but it was reported that the plane (of European military type) had previously crashed three times and had been rebuilt by persons declared incompetent and was thus impaired structurally and aerodynamically. Immediately after the Maynard party was killed, a dare-devil aerialist plunged to his death. The appalling effect of the two accidents lay simply in this: No flier was better known than Maynard. And if Maynard could not fly safely who could? Investigators are convinced that, had there been Federal inspection, the craft in which Maynard crashed would never have been permitted to take the air.

Illinois Leads in Accidents

As in previous years, the accidents were distributed throughout the country, with the Middle Western states again the scene of most of the crashes. Twenty-nine in the Eastern group, 67 in the Middle Western and 29 in the Far Western.* The East showed one less in 1922 than in 1921. The Middle West rose from 43 to 67 and the Far West decreased from 41 to 29. Illinois, with 25, California with 21 and New Jersey and Ohio with 10 each made the worst showing. In none of these states was there necessarily much flying, for where the gypsies flourish, trouble is sure to follow and a community which retains shocked memory of casualty is not a profitable field of operations for the conservative, fixed-base operator, who must perforce look to the locality for capital and patronage.

* One in Mexico is included in the 126 total.

There being no way in which to check the total mileage of itinerant fliers, rough estimates only are possible. Reports from all parts of the country tend to substantiate the belief that, in numbers of craft and in gross distance traversed by air, fixed-base operators and gypsies are about equal. Comparative records are illuminating, therefore, and may be regarded as indication of the safety of flying by permanent operators, whose discipline approximates that under Federal control, in contrast to the results of unrestricted, unguided activity.

Here is the parallel for 1922:

	Gypsy Pilots	*129 Established Operators*
Aircraft estimated to be in use	550 to 600	600 to 650
Mileage (that of gypsy estimated)	3,000,000	2,846,037
Number of accidents	126	12
Fatalities resulting	62	7
Injuries resulting	100	7
Mileage per accident	23,801	237,170
Mileage per fatality	48,388	406,577
Mileage per injury	30,000	406,577

The foregoing credits to the established operator the entire number of serious accidents, injuries and fatalities reported. Even so, the record shows what may be accomplished by control. If the activities of the fixed-base operators be further regarded from the standpoint of only those casualties in which they may justly be held as culpable, the comparison of responsible and irresponsible flying stands thus:

	Responsible	*Irresponsible*
Accidents	6	126
Fatalities	2	62
Injuries	4	100
Mileage per accident	474,340	23,801
Mileage per fatality	1,423,018	48,388
Mileage per injury	711,509	30,000

Under unrestricted, unregulated, unencouraged conditions, gypsy casualties may be expected to increase. Federal Air Law alone can provide relief. But in the meantime legitimate commercial aviation will continue and it is from the record of responsible operators, instead of irresponsible, that the safety of flying should be judged.

CHAPTER VII

CONTINUED DELAY IN OBTAINING FEDERAL AIR LAW; ATTEMPTS AT LOCAL AND STATE LEGISLATION; THE CIVIL AERONAUTICS ACT OF 1923

AS WAS stated in the Aircraft Year Book for 1922, the Wadsworth Bill (S. 3076), providing for the regulation and encouragement of commercial aviation through the establishment of a Bureau of Civil Aeronautics in the Department of Commerce, passed the United States Senate in February, 1922.

On reaching the House of Representatives, the Wadsworth bill was referred to the Committee on Interstate and Foreign Commerce, of which Representative Samuel E. Winslow is chairman. At that time the committee calendar was full, but the chairman, realizing the importance of the subject, and appreciating, further, that some members of the House (reflecting in this respect simply lack of understanding on the part of the public) were not fully informed on the reasons for and the ramifications of the proposed legislation, felt that it was necessary to proceed with care and deliberation. His desire was that when the act finally was passed, it would not be the result of immature judgment, but, to the contrary, would fit harmoniously into the structure of existing regulatory statutes.

Surprising as it may appear, the Wadsworth bill had not been fully analyzed by the Solicitor's Office of the Department of Commerce, so it was necessary for the Solicitor, William E. Lamb, to undertake extensive research work. Secretary Hoover, whose sympathetic attitude had long been apparent, directed further liaison with the legal staffs of other departments affected, especially State, War, Navy, Post Office and Treasury. This required time more particularly because Mr. Lamb approached the task with full realization of the importance of aviation and its application to the improvement and quickening of transportation and communication.

Evolve Practically New Bill

It was not until June 9th that Mr. Lamb was able to submit a draft to Secretary Hoover, and almost two months elapsed before subsequent studies were crystallized and a suggested definite form returned to the Committee on Interstate and Foreign Commerce. There was thus evolved practically a new bill, introducing new features and

inviting consideration of possible duplication or interference with existing statutes.

Chairman Winslow felt that it was imperative to have the draft expertly studied and so arranged with Middleton Beaman, Chief of the House Drafting Service, to have such a study made by Mr. Beaman's assistant, Frederick P. Lee. Mr. Lee, who later became chief of the Senate Drafting Service, was instructed to consider the proposed legislation with respect to the constitutional questions involved, the situation presented by the International Aerial Convention; certain departmental differences; the adapting of the existing customs, immigration, public health and other regulations to air travel; some of the administrative details in the creation of a Bureau of Civil Aeronautics and certain questions with respect to torts, crimes and court jurisdiction of matters relating to air navigation, as well as to questions of form, arrangement and clarity and other problems of draftmanship. This difficult task occupied the major part of the summer.

Deplorable Results of Prolonged Delay

This prolonged delay in obtaining Federal air law was deplorable for four reasons. First, was the need for the protection of public life and property, lost or destroyed through multiplying accidents among irresponsible fliers, an analysis of which was presented to the Secretary of Commerce by the Aeronautical Chamber of Commerce in 1922 (and again in 1923; see Chapter VI). The second was the blighting effect upon what would otherwise have been the natural growth of the aircraft industry. Capital refuses to flow into a business, without proper legal status. The third reason, while regarded by some as remote, because of the possible remoteness of war, was keen realization on the part of the Administration, as expressed by President Harding and by the Secretaries of War and Navy that, as long as the growth of commercial aviation is delayed, just so long will our national defenses be impaired and the ultimate cost of restoring them be increased.

Finally, there was the matter of local or state legislation. Paradoxical though it may seem, the very lack of understanding and appreciation on the part of the public (which is to say the Congress of the United States) of the present and future needs and possibilities of commercial aviation and the urgent necessity for enacting Federal law, invited and sustained widely scattered though persistent attempts to obtain local or state legislation.

Efforts in this respect are not to be wholly condemned, nor the motives of the proponents impugned. But the wisdom, with respect

to our future national position in the air, is very much open to question. If the Wadsworth bill, incomplete though it may have been, had passed the House early in 1922, the progress of aviation in this country might have been far different from what it turned out to be. But when the House, possibly through over-caution as to exactitude and complete harmony, adjourned for the summer without providing any national air law, there was immediately apparent, all over the United States, a demand for air ordinances in municipalities and regulatory laws in the states.

The fact that New York and Chicago, early in 1921, had passed identical aircraft ordinances, each prefaced with the specific declaration of continuance only until Congress passed national law, had a salutory effect on other municipalities, so that, by the end of 1922, probably a dozen cities had attempted some sort of control, in many cases prescribing limitation similar to that set forth in the New York and Chicago drafts. The obvious weakness of all, however, is the assumption that ordinary police power, limited physically to the earth, and necessarily within the confines of the city, is sufficient to curb reckless flying originating or terminating possibly in another state.

American Bar Association Urges National Law

The attitude of the legal bodies has been constructive. The principles of air law from the Federal standpoint had long been discussed by the American Bar Association and since the Armistice special committees on the law of aeronautics had been appointed. In 1922 this committee consisted of the following: William P. MacCracken, Jr., of Chicago, and a former aviator, chairman; George G. Bogert, Phillip A. Carroll, W. Jefferson Davis and Daniel W. Iddings.

At the suggestion of the American Bar Association, about thirty years ago there was created, by appointment from the several Commonwealths, a Conference of Commissioners on Uniform State Laws. This Conference, like the Bar Association, had, since the Armistice, manifested an increased interest in aeronautics. Several meetings were held prior to 1922, when a Committee on a Uniform Aviation Act was appointed and definite moves were made toward suggesting aerial laws by the various state legislatures. The Committee, in 1922, consisted of the following: George G. Bogert, Dean of the Law School, Cornell University, chairman; Charles V. Imlay, W. A. Morgan, W. H. Staake, A. T. Stovall and George B. Young.

In 1921 these State Commissioners had prepared a tentative draft of a Uniform Aviation Act which was not in harmony with the necessity of complete Federal regulation of aircraft. The Commis-

sioners arranged a conference in Washington, D. C., on February 25, 1922, which was participated in also by the Committee on the Law of Aeronautics of the American Bar Association, representatives of the departments and bureaus of the United States Government concerned with aviation, and by officers and members of civilian aeronautical organizations, such as the Aero Club of America and Aeronautical Chamber of Commerce.

The wisdom, for reasons of national policy, and the necessity, for reasons of practical application and enforcement in interstate commerce, of a Federal aviation act were forcibly presented. At the conclusion of the public hearings both committees went into conference. According to the official report, it was "agreed that Federal legislation was desirable, that it should be enacted as soon as possible, and that the Committee should co-operate for the purpose of aiding in drafting and passing such legislation; and it was agreed that it was undesirable to bring forward a constitutional amendment to give to the Federal Government exclusive authority over aviation until the initial Federal legislation had been enacted, because such an amendment would bring about delay and its necessity was doubtful; and it was agreed that some state legislation on the subject of regulation of aeronautics would be necessary, even if the Federal Government took control of all licensing and registration of craft, and the sentiment seemed to be that the Committee of the Conference on Uniform State Laws should endeavor to perfect its bill." "Nearly everyone agrees," the report continued, "that Federal control of licensing and Federal regulation are desirable ends, in the interest of uniformity, if they can be accomplished constitutionally. * * * * Recent decisions seem to remove the doubts on the subject of constitutionality. It seems better, therefore, to abandon the field of rules and regulations and licensing of craft and pilots to the Federal Government, and confine the State act to the elementary principles concerning the lawfulness of flight, responsibility for damages, and similar matters."

The Commissioners thereupon redrafted their proposed state bill, which is reproduced in the Appendix. At their annual meeting in San Francisco, August 2 to 8, 1922, the Commissioners presented a report to the American Bar Association, meeting in the same city, and this report containing the substance of the language quoted above, was accepted.

The Bar Association's Committee on the Law of Aeronautics, however, had approached the subject from the Federal standpoint. The majority, and particularly Messrs. MacCracken and Davis, the latter also a former aviator, felt that a national air code was impera-

tive. Mr. MacCracken, in an address at the First National Air Institute, Detroit, Mich., in October* presented his views in detail with forceful citations of law and precedent. At the San Francisco meeting of the American Bar Association, Mr. MacCracken, on behalf of the committee, presented the following report, which was unanimously approved by the Association:

To the American Bar Association:

The Committee on the Law of Aeronautics reports as follows:

(1) *Recommendation*

The committee recommends:

1. That the special committee be either continued or made a standing committee of the American Bar Association.

2. That until Congress has enacted legislation fostering and regulating aeronautics and until the Supreme Court has determined the extent of Federal control over aeronautics no further consideration be given to the question of a constitutional amendment to vest exclusive jurisdiction over aeronautics in the Federal Government.

3. That the members of the American Bar Association be urged to cooperate with the national authorities and with the local authorities in their respective States to the end that governmental action may result which will tend to the development of aeronautics in the United States, thereby contributing to our national prosperity and strengthening our national defense.

* * * * * * * * * * * *

Respectfully submitted,

WILLIAM P. MACCRACKEN, JR., Chairman,
GEORGE G. BOGERT,
PHILLIP A. CARROLL,
W. JEFFERSON DAVIS,
DANIEL W. IDDINGS.

The American Bar Association thus formally went on record as urging Federal air law, the apparent assumption being that such uniform state legislation as might be sought by the Conference of Commissioners would be supplemental and not in conflict.

The report of the Conference of Commissioners, and the substance of the discussions at the Washington meeting, were also apparently predicated upon the conviction that the Federal statute had priority and that state legislation should be regarded as secondary and supplemental. This idea, however, was not followed out, as will be shown later.

WORK ON FEDERAL LAW SLOWLY PROGRESSING

In the meantime work on a Federal bill by Congressman Winslow and Mr. Lee and representatives of the Department of Commerce was slowly progressing. Early in November, a tentative rewrite of the bill had been prepared. It was then requested by Chairman

* See Air Institute Section, Appendix.

Winslow that any differences in policy, suggested by other Government officers and any suggestions that might be obtained from the Committee on the Law of Aeronautics of the American Bar Association, the Committee on Uniform Aviation Act of the National Conference of Commissioners on Uniform State Laws and the Aeronautical Chamber of Commerce, be considered. Pursuant to this request, very active consideration was given to the entire subject by all of the above interests and on December 8, a tentative, confidential draft of the Civil Aeronautics Act of 1923 was printed. This tentative draft was sent to all those who had become known to be interested in the subject, with a request that it be studied and returned promptly with suggestions and comments.

Winslow Introduces Civil Aeronautics Act

Based upon the above and the comments and suggestions that were received in response to his request, Chairman Winslow, after final conferences with Secretary Hoover, introduced, in final form, on January 8, 1923, the bill known as (H.R. 13715) "The Civil Aeronautics Act of 1923."*

On introducing the bill, Mr. Winslow said: "The Wadsworth Bill which passed the Senate last February contained the elements of the desired legislation, but after being referred to the Committee on Interstate and Foreign Commerce of the House, I realized that the subject was so vital in its relation to the future security and prosperity of the nation, that inquiry into every angle was necessary. Thus, with the sympathetic co-operation of Secretary Hoover and Dr. Klein, Chief of the Bureau of Foreign and Domestic Commerce, I have gone thoroughly into the subject.

"It was soon apparent that it would be necessary to redraft the proposed legislation in respect of constitutional questions involved; the situation presented by the International Air Navigation Convention; certain departmental differences; the adaptation of the existing customs, immigration, public health and other regulatory legislation to air travel; some necessary administrative details, as well as certain questions in respect of torts, crimes and court jurisdiction of matters relating to air navigation, as well as questions of form, arrangement and clarity. Mr. Frederic P. Lee of the Drafting Service of the House, now Chief Draftsman of the Senate Drafting Service, was requested to make a thorough comprehensive study of the situation. The bill has been constructed under his advice.

"Representatives of the Commerce, War, Navy, Treasury, Post Office and Labor Departments, National Advisory Committee for

* For text of H.R. 13715 see Air Law Section, Appendix.

Aeronautics and such civilian organizations as the Aeronautical Chamber of Commerce, National Aeronautic Association, Society of Automotive Engineers, National Aircraft Underwriters Association, as well as the Aviation Committee of the American Bar Association, and the Commissioners on Uniform State Laws, have participated in our conferences. We believe that the bill will meet the needs adequately and constructively.

"The Act, in brief, provides for the establishment in the Department of Commerce of a Bureau of Civil Aeronautics. The Act is divided into five parts and establishes authority for the inspection and licensing of aircraft and pilots, establishing and certifying air routes and terminals, as well as rules of the air and their administration, and so co-operating with our Military, Naval, Postal and Commercial air activities that the whole can literally be co-ordinated into the Air Power of the United States. Aviation is, perhaps, the most significant mechanical development of this generation, contributing as it does to the speeding up of transportation and forming the key of our national defense on land and sea.

"In his inaugural message, President Harding urged legislation for the regulation, relief and encouragement of aviation. The establishment and development of Civil Aeronautics has the endorsement of the administration. The basis of Air Power must be a healthy, self-supporting aircraft industry. Among the needs of this industry are increased public confidence, increased capital and more favorable insurance rates. Public confidence will expand as the hazard of aviation diminishes. Capital undoubtedly will enter the field as soon as our basic law governing the operation of aircraft is established upon a sound and broad basis, and under responsible management and direction and reduced hazards, reasonable insurance rates will follow. It is confidently expected that the proposed Civil Aeronautics Act of 1923 will solve practically all of these problems."

What Winslow Bill Provides

H.R. 13715 provides for a Bureau of Civil Aeronautics in the Department of Commerce, to be administered (under the Secretary) by a Commissioner of Aeronautics. It proposes to regulate as an element of interstate commerce the operation of every civilian flying machine in the United States and possessions, all civilian flying and all air navigation facilities. The act, which is to take effect sixty days after it becomes a law, carried amendments to the navigation laws, to the Tariff, Public Health, Immigration, and the Narcotic-Drug Acts, the Criminal Code, etc.

No flying machine may be operated until it has been registered

and certified by the Bureau as being airworthy. Provisions are made for admitting aircraft under foreign registry. All aircraft shall be marked so as to make identification an easy matter. All civilian air navigation facilities, airdromes, routes, etc., must have a certificate as to their suitability for the purposes intended.

No persons who have not qualified by examination will be certified to pilot aircraft. Only those possessing such a certificate from the Bureau will be permitted to operate or pilot aircraft. A logbook or detailed account of all operations must be kept. Fines and penalties are provided for violations. The Secretary of Commerce is authorized to designate and approve all public and commercial air routes, and to maintain them adequately whether they are owned by the Government, State or municipality. Maps shall be made available along with periodic reports giving in detail all information relating to civil aviation.

Government airdromes such as those operated by the Army, Navy and Air Mail Services are authorized to sell to civilian aircraft alighting there such equipment and supplies as may be necessary to aid them in continuing on their way to the nearest private or public field.

The President is authorized to prescribe reserved air spaces for public safety or national defense; and over these spaces civil aircraft may not fly without special authority. The measure literally makes all civil aircraft subject to regulations when engaged in inter-state and foreign commerce.

The Bureau of Civil Aeronautics will have full administrative powers and may invoke the aid of the courts in carrying out investigations, penalties, etc. The Secretary of Commerce is empowered to appoint a "civil aircraft consulting board" composed of seven members representative of the manufacturing, designing, engineering and operating branches of the art, to act in an advisory capacity in the solution of all problems arising in American civil aviation development.

Congress Adjourns; Bill Dies

The bill, as finally introduced on January 8, 1923, was referred back to Mr. Winslow's Committee and the Committee as a whole in turn referred it to a special Sub-Committee, composed of the following Congressmen: Samuel E. Winslow of Massachusetts, Chairman ex-officio; Everett Sanders of Indiana, Schuyler Merritt of Connecticut, Carl E. Mapes of Michigan, Homer Hoch of Kansas, George Huddleston of Alabama and Clarence F. Lea of California. The Special Sub-Committee did not see its way clear to hold hearings

and the 67th Congress came to an end, without having this important subject considered by the House.

Distressing as this failure was, further discouragement was caused by the energetic activity of the Conference of Commissioners. No sooner had the hopelessness of passing the Federal law during the Sixty-seventh Congress become apparent than the Conference caused to be introduced simultaneously in the legislatures of forty or more states a revised draft of their proposed uniform act.

This procedure, in view of the Conference's report and discussions at the Washington meeting, was widely deplored. The proposed state measure is objectionable because it is based upon the assumption of Federal licensing, etc., *before* (*not after*) a Federal law has been passed. It was, as one observer expressed it, like decorating a building before the foundation and roof are complete. This precipitate state legislation was promptly and vigorously opposed, and at the time of publication, North Dakota alone was reported to have passed it.

In spite of this situation —procrastination on the part of Congress and precipitancy on the part of the Conference of Commissioners— the civilian operation of aircraft in this country has continued. This fact alone is convincing evidence, not only of the inherent and persistent need and demand for aerial service, but also of the courage and tenacity of American operators of aircraft. A survey of the Aeronautical Chamber of Commerce late in 1922 showed that forty nations of the world have some sort of air law, based in most instances on the International Convention for Aerial Navigation, while the United States has none.

CHAPTER VIII

AIRSHIP PROGRESS IN 1922; THE NAVY ZR-1; THE ZEPPELIN REPARATIONS SHIP ZR-3; THE GOODYEAR ARMY SEMI-RIGID R-1; STEPS TOWARD COMMERCIAL OPERATIONS

NO more conclusive evidence of the substantial nature of the claims of the airship can be conceived than the lighter-than-air progress made in 1922—a year marred in the beginning by the destruction in February of the *"Roma,"* the army semi-rigid purchased from Italy. In 1921 the Navy suffered a bitter experience with another foreign-built ship, the *ZR-2* which broke in the air and then took fire soon after its completion in England. Publicity established America's position as one of the leading nations in months of each other, was utterly depressing. Nevertheless, the Army, Navy and civilians carried on; and their activities were such as to warrant the assertion that the year 1922 may be said to have established America's position as one of the leading nations in lighter-than-air development.

All those interested in this phase of aeronautics were particularly concerned with the two rigids and one semi-rigid nearing completion in December, 1922, and scheduled for initial flights in 1923. One was the *ZR-1*, the Navy rigid, fabricated in this country and assembled by the Naval Bureau of Aeronautics at the Lakehurst, N. J. hangar. The other rigid was the Zeppelin *ZR-3*, a commercial type being built by the Luftschiffbau-Zeppelin at Friedrichshafen, Germany, and about to be flown to this country and turned over to the United States Government as a reparations ship. The semi-rigid was the *R-1* designed for the Army and constructed by the Goodyear Tire and Rubber Company at Akron, O. The *ZR-1* was the first rigid to be built in America and the *R-1* the first semi-rigid. With the *ZR-3* reparations ship, they were to form a nucleus for the lighter-than-air division of the aerial fleets which must be developed as an integral part of the national defense and transport system.

THE *ZR-1*

The huge metal skeleton of the *ZR-1* in six months had grown up from some four hundred thousand pieces of duralumin turned out at the Naval Aircraft Factory in Philadelphia, until on Jan.

1, 1923, it nearly filled half of the Lakehurst hangar, the only one on this hemisphere built to house two rigids of the size represented by the *ZR-1*.

One rarely sees such vast space roofed over and enclosed with glass and steel. A sixteen story skyscraper could be pushed under the doors and along the floor for 800 feet, or more than three average city blocks. Wireless stations, laboratories, repair shops, a hydrogen gas plant with a daily capacity of 75,000 cubic feet, quarters for a thousand officers and enlisted men as well as hundreds of civilian employees, these and other structures are clustered about the huge shed which dwarfs everything else, even the mooring mast set up a half mile or so from the hangar doors. In appearance the mast is a lesser copy of the Eiffel Tower. It is 165 feet high. Its base forms an equilateral triangle of structural steel, sixty feet on each side, and it tapers to a platform at the top. On the ground level are motor winches, gasoline and water pumps and elevator machinery. The motors work the elevators and operate the pumps and winches, which haul the airship to the mast and hold it in place by means of great cables. Fuel, water and gas are then taken aboard the ship from the platform above, as are the passengers, while the airship is moored there. Eventually all principal cities will have similar masts for airship anchorages, just as ships have piers.

Meanwhile the Army Air Service has another large shed at Belleville, Ill. It is 810 feet long, 150 feet wide and 150 feet high. The Naval Bureau of Aeronautics operates a single ship shed at Cape May, N. J. The major activity for 1923, however, centers about the Lakehurst shed, where the *ZR-1* has taken form majestically in that huge space.

Nearly all the initial assembly work had been done from platforms let down from above. For the last six months in 1922 many of the 200 workmen employed on the construction had clung to ladders, let-downs and platforms inside and out of the metal latticed frame, silhouetted like ants against a window screen.

The *ZR-1* was designed by Naval engineers basing their calculations on the plans of the Zeppelin *L-49* which was captured by the French, who made plans and distributed them among the Allies. At the request of Rear Admiral W. A. Moffett, Chief of the Bureau of Aeronautics, a committee of experts from the National Advisory Committee for Aeronautics inspected and approved the plans. All available talent had been used in the construction of the frame work which was fabricated at the Naval Aircraft Factory in Philadelphia and taken to Lakehurst for final assembly. Structurally

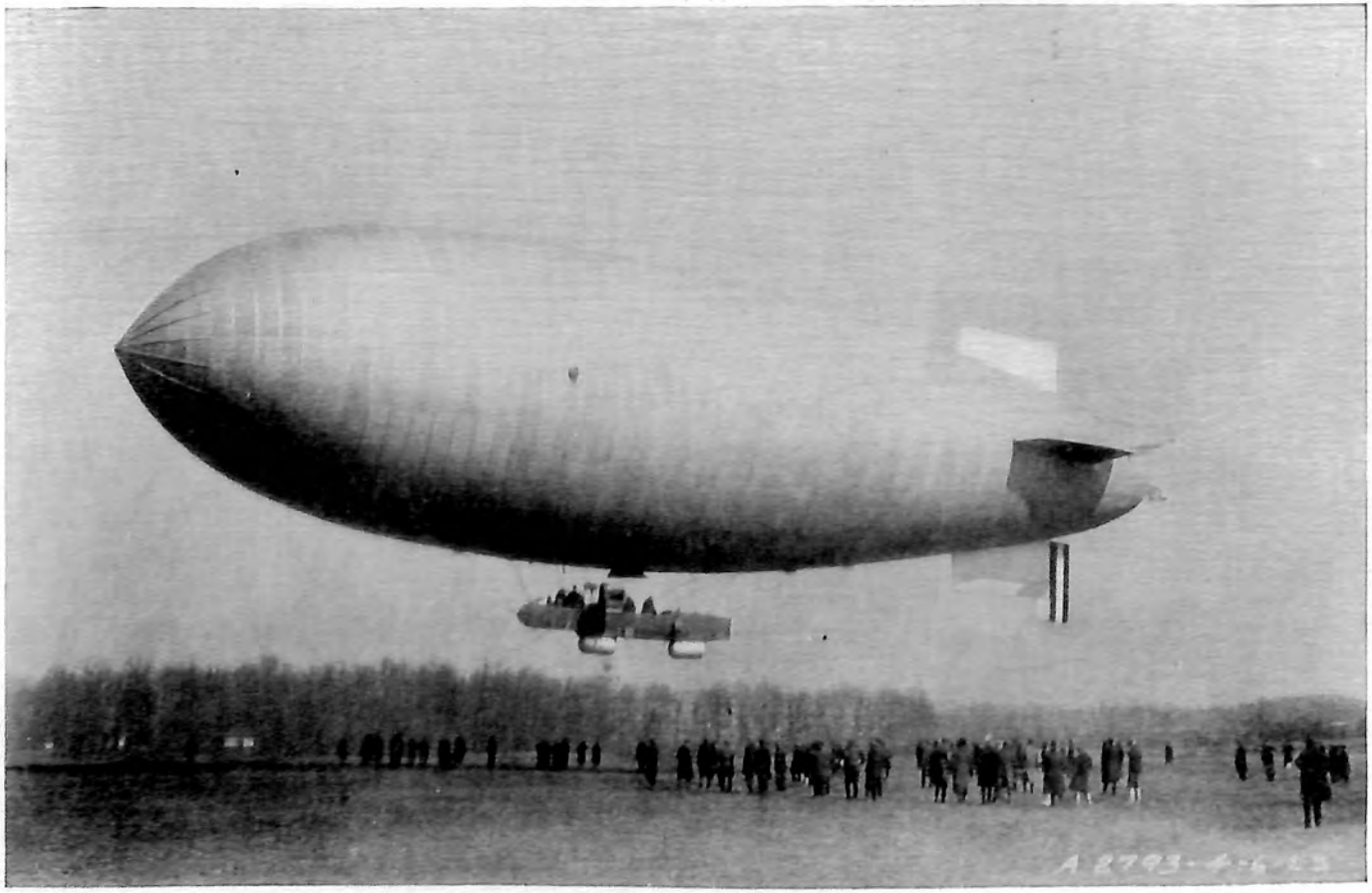
the *ZR-1* should be as strong and airworthy as possible to make her. Every bit of duralumin has passed rigid tests. Germany built and operated thirty-six ships of the parent type during the war and the knowledge that led to the development of the Zeppelins gave the American engineers considerable foundation for their own calculations.

At this writing it is planned to inflate the *ZR-1* balloonettes with helium, the non-inflammable gas, which, although it lacks 8 per cent of the buoyancy of hydrogen is absolutely safe. Helium is a by-product of certain natural gases and several methods for extracting it have been tried. None of them has succeeded in producing it economically, that is, at less than 10 cents a cubic foot, though the Government experts believe they will shortly reduce the cost to about 3 cents per cubic foot. The matter of saving the gas once it is put into the airship will be not the least important of many new experiments to be tried out by the American engineers when they have the airships with which to conduct the tests.

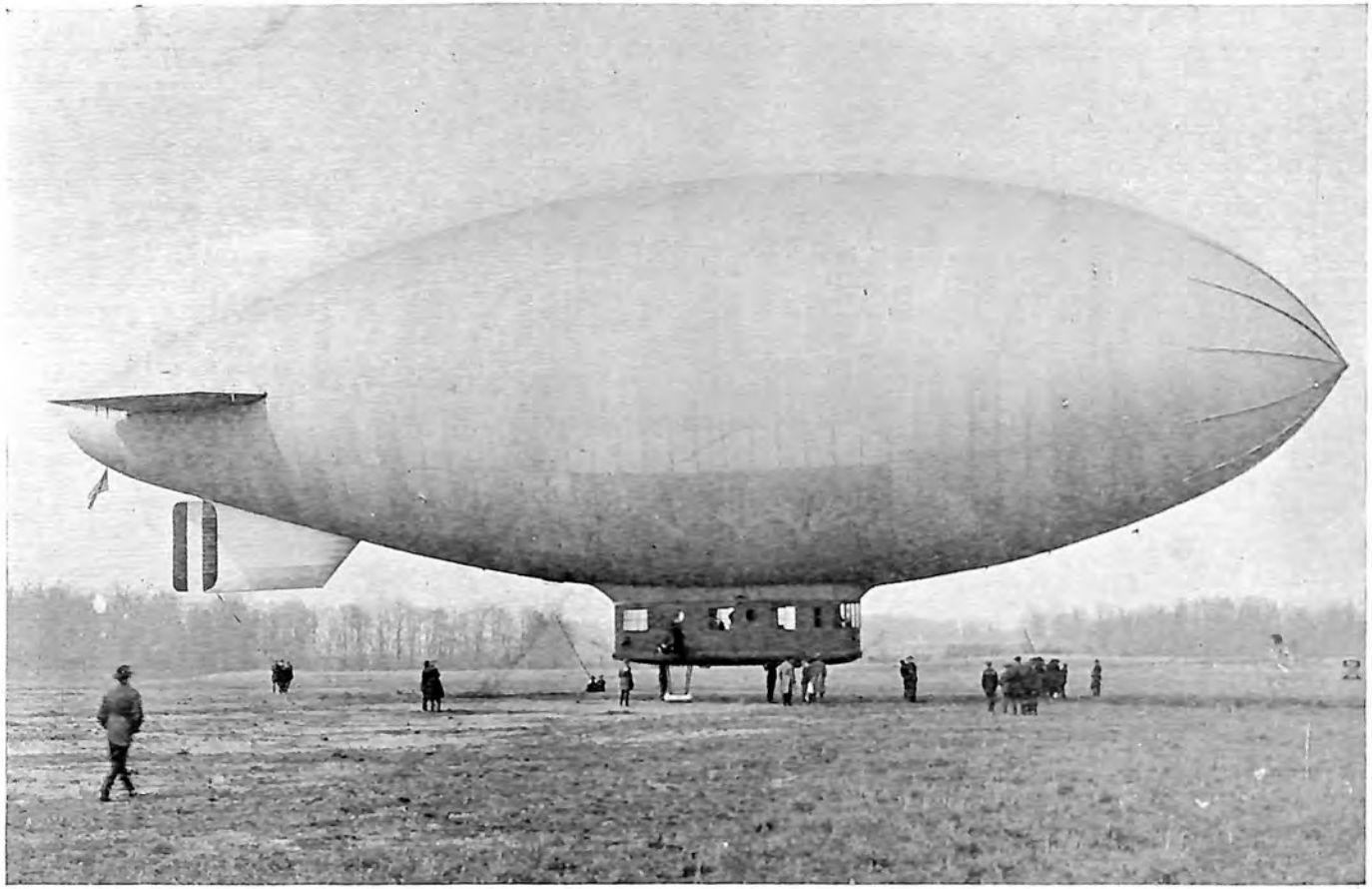
There will also be new engine tests calculated to devise means of conserving fuel and thereby reducing the fuel load of an airship and enabling it to carry greater pay loads. But with the helium problem once solved, it is claimed that a rigid airship can lose even her rudder and parts of her nose and tail and still be brought safely to earth. The Navy *C-7* and the Army *AC-1*, both non-rigids, were flown with helium in 1922.

The *ZR-1* is intended by the Navy for work with the surface fleet. It is 677.49 feet in length and 78.74 feet in diameter. The 20 gas cells or balloonettes inside the frame and fabric envelope have a total capacity of 2,115,000 cubic feet of buoyant gas. Around these cells are nineteen ring frames, between which are lighter rings, making a total of forty-one rings. They are connected by longitudinal girders extending from nose to tail. Rings, girders and braces, approximately 400,000 pieces of duralumin, are riveted together like bridge-work and braced in place by heavy wire.

The control car is located forward under the bow close to the keel. The engine cars or "power eggs" are hung at intervals near the keel and range along the ship between the control car and the tail structures. Distributed in the control car and gunner's cockpit on top of the hull, machine gun armament identifies the *ZR-1* as a fighting ship. With this armament she is expected to cruise comfortably at 45 miles an hour for 4,000 miles non-stop, though her average range is estimated at between 2,000 and 5,000 miles. The *ZR-1* weighs 76,000 pounds without fuel, supplies or crew. She will be able to carry from 30,000 to 50,000 pounds of



Goodyear U. S. Army Air Service Airship TC-1.



Goodyear Airship Type AC.

fuel, personnel, supplies and so forth, depending on whether helium or hydrogen is used and the degree to which she is inflated. The crew will average between 20 and 25 officers and enlisted men.

Six 6-cylinder airship engines, especially designed and constructed by the Packard Motor Car Co., will turn the six 18-foot propellers. These engines aggregate 1,800 horsepower.

The *ZR-3*

The *ZR-3* is a commercial type. With all their knowledge and continuous experimenting the Germans were prevented under the Versailles treaty terms from building ships of sufficient size to warrant the effort of creating strictly commercial types. The Allied requirements that the *ZR-3* reparations ship must be used only for commercial purposes gave them an opportunity. In the *ZR-3* the Zeppelin company have put whatever they desire to show the world as proof of what they can do. And they want to show the world. The airship builders realize that for some time to come Germany will be in no position to finance extensive commercial airship operations. They, therefore, look to the United States for the development that will afford their methods, their engineering forces and their scientific staffs a chance to continue that sort of development. The *ZR-3* is 650 feet long, 90.75 feet in diameter and her height, 101.8 feet from the floor of the control car to the top of the hull. Her speed will range between 45 and 71 miles an hour. The passenger quarters which will accommodate thirty, are similar to those on a Pullman car, seats ready to be made up into berths at night. The crew will number about 30 men. A majority of the crew, excepting the officers, will sleep in hammocks and bunks inside the hull near the keel. Quarters are located so that mechanics and others will at all times be near the scene of their duties.

The passenger quarters are in the central part of the control car. Nearby is the electric kitchen where meals will be prepared. They will be served in the passenger cabin. Forward are the radio and engineer's room and up in the bow is the navigator's cabin, corresponding to the bridge on a surface vessel. The glass enclosed bow resembles a bridge on a private yacht. Signalling devices are arranged similar to those on shipboard. And the usual watches will be kept while the ship is in flight. There will be helmsmen always on duty. The ship will be kept ballasted, the water ballast shifted here and there to compensate for the consumption of fuel which also acts as a ballast. The checking up of the gas quantity in the gas cells must be continuous. The *ZR-3* is scheduled to be flown across from Berlin to America sometime in the Autumn

of 1923, in charge of a German screw. Her gas capacity is 2,475,000 cubic feet. She has a gross lift of approximately 150,000 pounds, 60 per cent of which will be useful load, including passengers, fuel, supplies, etc.

Her engines are Maybachs, but directly reversing without gears. There are 5 of them, of 400 horsepower each, arranged in cars swung underneath close to the keel. The Navy, it is thought, will operate the *ZR-3* on a series of trial demonstration and training flights to prove the practicability of operating commercial airships.

The American representative of Luftschiffbau Zeppelin is Harry Vissering of Chicago, who is co-operating on behalf of the Zeppelin Company with the United States Army and Navy officers.

Notable Army Flights

During the year 1922 the Army airships made many cross-country flights, which demonstrated the possibilities and capabilities of even the smaller size of airship. There might be mentioned the flight of the *D-3* while stationed at Aberdeen Proving Grounds, to Media, Pa., and return; and later to Hartford, Conn., and return by way of the U. S. Military Academy at West Point, N. Y.

The Airship *C-2,* while stationed at Aberdeen, made a very successful night flight from that station to New York City and return. But the most important flight from that of the *C-2* from Langley Field, Va., via Akron, O., Dayton, O., Belleville, Ill., San Antonio, Tex., Camp Bierne, Tex., Nogales, Ariz., Ajo and Yuma, Ariz., and Ross Field, Calif., to San Francisco and its return via Ross Field, Calif., Camp Bierne, and Fort Clark to San Antonio, Tex. The purposes of that flight were to investigate airship routes across the United States, landing fields not already known, to demonstrate the capabilities of that type of airship, to train the crew in long distance flying, to determine the best methods of mooring and caring for airships at places other than where Air Service troops and hangar facilities were available, to educate the American public and stimulate their interest in commercial aeronautics, as well as to determine the actual equipment and crew necessary for such flights. The flight as such was a success. That its return trip was interrupted was one of those accidents that occur in all attempts at blazing the way for progress, though the accident could as well have occurred in ordinary operations when struck by unexpected squalls. Great difficulties, both expected and unexpected, were met and overcome. The flight proved the airworthiness and reliability of the C type of airship, and though no attempt was made to

establish a record for speed or endurance, the entire trip from Langley Field, Virginia, to Ross Field, California, was made in 67.4 hours actual flying time.

The *C-2's* longest single flight was from Scott Field, Illinois, to Brooks Field, San Antonio, Texas, a distance of 850 miles, in 16⅓ hours, during which it passed through several storms, yet landed with a good supply of fuel remaining. It is interesting to compare the above with train travel. The fastest trains make the distance between St. Louis and San Antonio, near which the above fields are located, in 28 hours' time.

If sufficient funds can be secured, the Air Service contemplates making pathfinding flights during the year 1923 to Panama and return, and also to the Northwestern part of the United States, and thence to Alaska and return.

The Goodyear Army *R-1*

While the Goodyear Tire and Rubber Company had much to do with Army and Navy airship activities during the year, construction of the *R-1* promised to be the most spectacular, according to W. C. Young, manager of the Aeronautics Sales Department of the Goodyear Company, because of the unusual qualities in America's first home-made semi-rigid. The *R-1* is 300 feet in length. The hull is 71 feet in diameter and the total height from the floor of the control car to the top of the gas filled hull is 85 feet.

Designed for helium gas as are all American airships, the *R-1* has a capacity of 700,000 cubic feet. The navigation or control car is 35 feet long, 9 feet high and 8 feet wide. The two power cars, each accommodating two low compression Liberty engines of 300 horsepower each, or 1,200 horsepower in all, are 18 feet long, 8 feet high and 6 feet wide. Like the control car they are attached to the metal keel of the ship.

The semi-rigid will carry 2,500 pounds of gasoline, 200 pounds of oil and 4,500 pounds of water for ballast. Her total weight is 25,035 pounds. Her 17-foot propellers can send her through space at 70 miles an hour, or she can cruise easily from 3,000 to 5,000 miles. She could cruise with perfect safety from New York to San Francisco or from Liverpool to New York at 50 miles an hour, completing the journey in 60 hours. At 45 miles an hour, she could go from Liverpool to Chicago in less than 90 hours, or make a round trip between New York and Chicago every 24 hours.

The ship was designed by Goodyear engineers working in conjunction with the army engineers at McCook Field, Dayton, O. Her gas cell is practically a single balloon, though it has 3 dia-

phragms extending longitudinally through the middle from nose to tail. A cross section looks not unlike the outlines of a heart placed on a triangle shaped keel. At each end of the keel it terminates in a cone shaped structure fixed to help hold the big bag in shape. The *R-1* has been designed as an airplane carrier; and late in the year experiments were already under way toward perfecting apparatus to enable planes to be attached to and freed from airships. It was believed the next year would find lighter than air craft equipped with hooks and hoisting apparatus for taking aboard and discharging planes while traveling at 60 miles an hour.

Other Goodyear activities included production of the non-rigid types of blimps for the Army and Navy, among them the *AC* Army, Navy *J-1*, Navy *H* towing airship, 21 Navy and Army kite balloons, 36 gas cell and 48 water ballast bags for the *ZR-1*, an 80,000 cubic feet racing balloon for the Army, 13 advertising balloons for civilians and many airship accessories.

The Goodyear Army *AC* type blimp built for helium gas is the first non-rigid ship to have the control car placed directly against the envelope. It also has the special gear-driven engines designed by H. T. Kraft, chief aero engineer of the Goodyear Company.

Airships, Incorporated

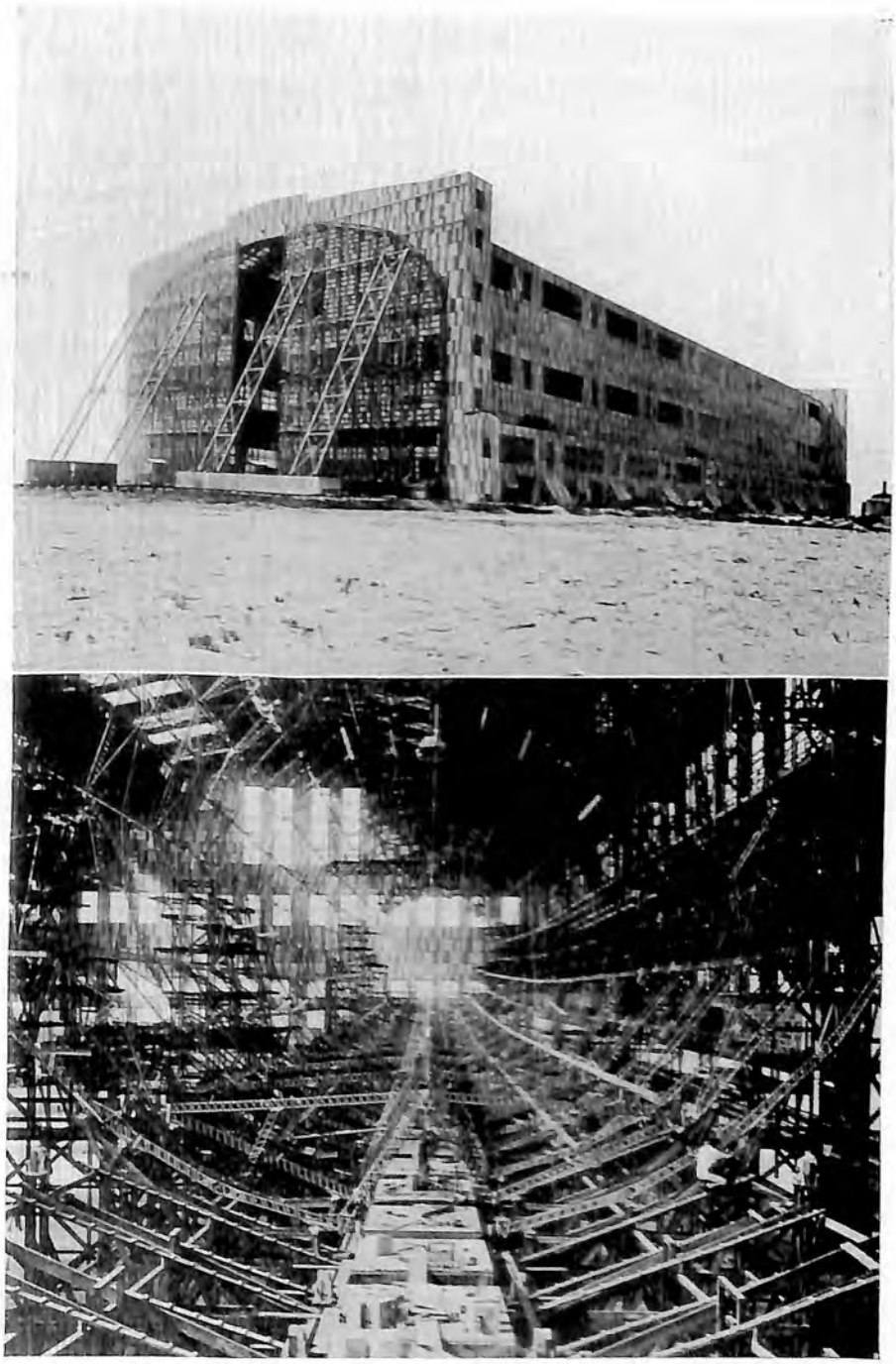
At the plant of Airships, Incorporated, at Hammondsport, N. Y., the corporation was building lighter-than-air equipment for the Army and Navy. Among the craft are the Zodiac types of dirigible and also a towing balloon for the Army. Recent tests in spraying orchards, groves, and plantations with various insecticides dropped from planes, have led officials to believe that spraying can be done more successfully by airships because they can move slowly and virtually hover over an objective. Experiments with spraying from lighter-than-air machines may be undertaken in 1923 with the equipment made by Airships, Incorporated.

Goodrich Development

The B. F. Goodrich Rubber Company of Akron, O., which during the war supplied much lighter-than-air equipment, again entered the field in 1922, appointing Henry Wacker special aeronautics representative in charge of a program to develop the airship and accessory market for Goodrich products.

Aircraft Development Corporation

A significant step in American airship progress was the incorporation, in 1922, under the laws of Michigan, of the Aircraft De-



Great dirigible Hangar of U. S. Navy at Lakehurst, N. J. *Below*—Looking aft along keel of ZR-1.—Official Photos, U. S. Navy.

In litigation involving the ownership of shore line on Long Island Sound, the above picture was used to show the effect of the wash of the sea and the consequent loss of valuable property.—Photo, Fairchild Aerial Camera Corp.

velopment Corporation. Its announced purpose is engineering, development and research in commercial and military aircraft, particularly lighter-than-air. Identified with this organization are some of the most prominent men in Detroit. Harold H. Emmons is president and Carl B. Fritsche, general manager. Ralph H. Upson, long chief aeronautical engineer of the Goodyear Tire and Rubber Company, is chief engineer.

Commercial Transport Projects

An important research work carried on during 1922 with a view toward the ultimate establishing of an airship line for passengers and freight was that of the American Investigation Corporation, of New York, which has completed its preliminary collection of data during the year, and has taken up the last stage of its work previous to the actual embarking on commercial airship transportation.

The most important point undetermined up to last year was the practical facilities for constructing large airships in this country, both from the material and labor point of view. To settle these questions, the American Investigation Corporation arranged for a visit of inspection in this country by Dr. Johann Schuette, of the German Company of Schuette-Lanz, whose plans have been accepted by the Directors of the Corporation as being the best suited for commercial development in the United States. It has been the general policy of this company and of the extremely conservative men of large affairs represented in its list of stockholders, to reverse the usual American procedure in regard to radically new departures in transportation, of starting in to do it first, and finding out how it ought to be done afterward.

In conformity with this policy, the Directors considered it necessary to secure the positive affirmation as to the facilities existing in this country for such construction, such a statement to be based on personal inspection by an airship engineer of world-wide reputation, experienced in all the elements needed for successful airship construction.

The corporation received a most emphatic verdict from Dr. Schuette, to the effect that he was convinced by personal inspection that the United States possessed already every facility needed to construct as good or better airships than any other country in the world. In Dr. Schuette's report he says:

"In this country it is possible to build as fine airships as have been turned out in any other country in the world. I have gone into this thing thoroughly, both from the scientific and economic points of view. I visited the Navy plant at Lakehurst, N. J., and was surprised to see the progress made

in such a brief time. What I saw impressed me greatly. In point of workmanship the American builders are up to standard and I do not believe we could do any better in Germany. In a country of the enormous size of the United States, rigid airships will be of the utmost importance in supplementing present known methods of transport. Airships operating as trunk lines can maintain routes east and west across the continent. Feeder lines can operate north and south, and in this service airplanes can be employed. I believe airships can be operated at a profit in any direction. The planes will supplement airships, however, by doing the work on the short hauls out of the airship terminals. The only thing necessary for the development of rigid air craft in this country is capital—and I might add courage. With encouragement there is nothing to prevent the country from leading the world in airship building and operations."

Dr. Schuette estimated that fifteen months would be sufficient for the launching of a 660-foot airship, from the time the work was first started on it. He agreed to the conclusion already reached by the American Investigation Corporation that helium gas was practically essential for any commercial ship, owing to its non-inflammability, and was convinced that the sources of supply in this country, as determined by the corporation, would be ample for the needs of the transportation line.

Development of the American Investigation Corporation plans are watched with great interest. The terms of the Versailles treaty, coupled with the troubled and conflicting political conditions in the various European countries, make improbable the starting of an international airship line and no country, with the exception of Russia, is sufficiently vast to permit the operation of a national overland line for 600-800 miles, the minimum economic airship distance.

The United States was selected, first, because of its freedom from treaty complications, second, because of its great size, third, because it has a natural monopoly of helium, and fourth, because it has large centers of population separated by long distances. The further selection of the New York-Chicago route followed for obvious reasons. The distance by rail is about 950 miles; by air 750 to 800, according to variation forced by weather.

Of this route, Snowden A. Fahnestock, president of the American Investigation Corporation, said:

"The New York to Chicago route was chosen for our first demonstration, notwithstanding the uncertain air conditions, because the greatest density of high speed of railroad passenger travel appears to be between those two cities. The same is likewise true in regard to mail and express matter. The overland route was chosen for the first demonstration in preference to an overseas route, where air conditions are easier, largely because of the psychological effect on

the traveling public, who would rather see attractive scenery unrolling below them, than to travel across the Atlantic most of the way in a fog bank. We believe that the timid passengers will feel more secure with land underneath the ship than looking out upon unlimited prospect of sky and water. The practical side of the matter, when taken into consideration, would also call for an overland journey, where the ship, traveling on her daily route, would be seen by thousands of people, whereas overseas only the start and arrival would be observed. The expense of demonstrating over a short route, as against the transatlantic trip is a further consideration.

"The air-line route will undoubtedly be followed until mail traffic makes it desirable to pass over intervening cities for the purpose of dropping mail. As the air-line between New York and Chicago is about the shortest journey or trip that will justify the large and profitable airship, it would seem wise to build up through traffic, before any stops on the way are considered.

"The initial type of ship will probably be slightly larger than the *ZR-1* which is now under construction at Lakehurst. Its principal dimensions will be approximately as follows: Length over all, 660 ft.; outside diameter, 80 ft.; total height, 100 ft.; gas volume, 2,200,000 cu. ft. (helium); horsepower applied through 4 propellers, 2,400; maximum speed, 80 miles per hour; average speed, 67 miles per hour; number of passengers, 50.

"With 50 passengers, and gasoline, oil and water ballast for a radius of action of 1,600 miles, such a ship would carry in addition over 9 tons of mail and express matter. The passenger accommodations are located in a commodious compartment swung under the forward third of the keel of the ship, and, even in this small initial type, will be provided with sleeping-car accommodations of extremely comfortable design. Meals are served enroute from a galley. On the full-size ships of over three million cubic feet capacity, which would carry 100 passengers on the New York-Chicago route, over half of these would be taken care of in double staterooms, and there would be an attractive dining-room seating 30; and an observation lounge in the forward part of the passenger gondola. Mail and express matter is carried in the keel of the ship.

"Air terminals should be organized by municipalities or some public body, and provide facilities such as mooring-masts and landing space for both airships, airplanes, and, if possible, seaplanes. A common terminal is desirable in order to facilitate ready transfer between three modes of air travel, and, of course, should be located nearer the heart of our large cities, than would be possible if various companies, giving air service, competed for the necessary areas. So far as airships are concerned, their hangars need not be at the terminal station. One very obvious requirement is that the air port be located on some means of rapid transit."

CHAPTER IX

REVIEW OF AERONAUTICS THROUGHOUT THE WORLD, NATION BY NATION

THE following data have been compiled from reports received from representatives or correspondents of the Aeronautical Chamber of Commerce; from the Air Service, United States Army; Bureau of Aeronautics, United States Navy; commercial attachés; Department of Commerce; and the Pan-American Union. Special assistance has been provided, with regard to their respective countries, by the air attachés of France, Great Britain and Italy, stationed at Washington. All dates, unless otherwise indicated, are for the calendar year 1922.

ARABIA (British Empire)

Great Britain maintains an air base at Aden.

ALGIERS (France)

In conformance with its strongly established policy of developing its Colonial defenses in the air, the French Government operates a passenger and mail service three times a week between Algiers and Biskra. October 6th the French established a new air line between Oran, the metropolis of Western Algeria, and Casablanca, on the west coast of Morocco, a distance of 430 miles, trips being made twice a week.

ARGENTINA

The Government has made distinct progress in its effort to work out an aviation policy which will provide substantial impetus to commercial enterprises. Appropriations for aviation in 1921 amounted to $271,263.17 and in 1922 to 1,000,000 pesos ($964,800). It is estimated that there are in the republic 191 airplanes, of which 100 are utilized by commercial operators, 61 by the army and 30 by the navy.

The military air service embraces 48 commissioned officers, 93 non-commissioned officers, 476 soldiers and 50 civilians. The principal aviation officers are: Lieutenant Colonel Jorge Crespo, Chief of Aviation Group No. 1; Major Anibal Brihuega, Chief of Aviation Park; Captain Angel Zuloaga, Chief of General Services. The

naval air service embraces 29 officers and 80 men. Principal naval aviation officers are: Captain Ricardo Ugarriza, Director-General of Navigation and Communications; Captain Horacio Esquivel, Chief Naval Aviation Division; Captain Jose C. Gregores, Director Naval Aviation School.

This republic, like other South American countries, where distances are great and existing surface transportation facilities inadequate, is being cultivated by European governments as a market for aircraft and supplies. The British and Italians especially have been active and the Argentine Government is reported to have purchased ten training-type seaplanes from Great Britain, and four planes and a semi-rigid airship from Italy. The Navy heretofore has utilized various types of American flying boats and the Army Curtiss training planes.

Notwithstanding the handicap of official aviation missions sent by various European governments, American enterprise, in the form of the Curtiss Aeroplane Export Corporation, has been very successful. This is the largest civil aeronautical organization in the republic. Its airdrome and headquarters are at San Fernando, a suburb of Buenos Aires. The work is in charge of Lawrence Leon. The field is well-equipped and is capable of servicing the 45 Curtiss machines in Argentina.

During 1922, the Curtiss Aeroplane Export Corporation and the owners of Curtiss machines trained more students to fly, carried more passengers and covered more mileage than all other private or commercial aeronautical organizations in the Argentine combined. It is estimated that Curtiss airplanes covered, roughly, 100,000 miles during the year without a single injury. In addition to civilian-owned machines, both the Army and Navy include Curtiss airplanes in their equipment.

The principal other commercial company is the Compania Rio Platenoe de Aviacion, S. A., which has three British amphibian machines in operation between Buenos Aires and Montevideo. The Government grants this company a subsidy of $1,700 for carrying mail. The company is free to carry passengers.

A federation of the Argentine aero clubs was organized under the name of the Federacion Aeronautica Nacional to encourage the development of national aviation. In the federation are the Aero Club of Argentina and local bodies at Rosario, Cordoba, Corrientes, Santiago del Estero, Pergamino, Necochea, Tucuman, Santa Fe and Balcarce. The Aero Club of Argentina has thirteen planes. It is expected that a chain of fifteen airdromes will be organized through the republic. January 6th the club opened a new field and flying

school at San Isidor. The aero club receives from the Government a subsidy of $4,245 a month.

The Government has recognized the dual value—commercial and military—of the air mail. A vast district now reached only twice a month by surface craft, operating on the Bermejo river from its junction with the Parana to Presidente Roca, will be served in the future by flying boats capable of carrying eight passengers and one metric ton of freight. It is understood that the flying boats purchased from Italy, and one bought from France are to be utilized in this work. The distance by surface boat is 270 kilometers (167.8 miles). The trip will consume a few hours by air, as compared with days by river boat.

An agreement has been reached between the Minister of War and the Director General of Post Offices and Telegraphs whereby air mail routes are being established between Buenos Aires and commercial centers throughout the Republic. Military equipment is to be utilized, but in peace time the Post Office Department is to be responsible to the public for operation. The contemplated routes from the capital include the cities of Azul, Bahia Blanca, Patagones, San Antonio Oeste, Rawson, Comodoro Rivadavia, Rio Gallegos and Ushuaia.

Australia (British Empire)

Commercial aviation in Australia is receiving substantial encouragement from the Commonwealth Government. Two air mail services have been organized, which, though conducted by private firms, are subsidized by Government grants and are under the control of the Civil Aviation Branch of the Defense Department. One route operates from Geraldton to Derby in Western Australia; the second is a regular mail, passenger and freight service between Charleville and Cloncurry, in Queensland. The first service is subsidized by the Federal Government to the amount of £25,000 ($125,000) annually, and the second £12,600 ($63,000) annually. All subsidies require that types of planes used in commercial work shall be readily convertible to military uses.

The strength of the Australian Air Service is 46 officers and 252 men; 170 planes are in operation. The tendency of the Government has been to lay emphasis upon commercial aviation as the foundation for national defense, instead of concentrating wholly upon an unproductive military force. Measures also are being taken for the building up of an aircraft manufacturing industry. The Premier has submitted to Parliament the details of a contemplated air

service whereby Australia would be linked with India and South Africa via Egypt.

A number of municipalities are establishing their own airdromes, especially in the west of New South Wales, where the majority of the principal towns are negotiating with the Lands Department with a view to securing suitable areas under their direct control. Certain municipalities in Queensland and Victoria are proceeding along the same lines.

Austria

The economic conditions in Austria in 1922 were such as to impose practically insurmountable obstacles in the development of commercial aviation, although early in October restrictions on Austria, as applied to the construction of military airplanes, were removed; these restrictions were devised in the Treaty of St. Germain. Austria is now free to resume manufacture of strictly commercial types of aircraft.

During 1922 Austria delivered to the Inter-Allied Military Commission of Control the following aeronautical equipment: hangars, 97; airplanes, 1,082; seaplanes, 47; motors, 2,837; rotary motors, 137. Of the allied nations, Japan and Italy alone took practically all their share. The portion allotted to the United States was about 12 per cent.

Belgium

The aviation policy of Belgium was strongly influenced by the military alliance with France. In the World War, the Allies, and especially France, found the Flemish plains ideal for flying bases. The French continue to use Belgian fields (see France, this chapter) for their operations in the Ruhr and other occupied portions of German territory.

This close co-operation with the French is reflected in other ways, notably the scheme of subsidies, so that it is reported that Belgium is fast becoming the center for aviation in Western Europe. The same factors that made Belgium a railroad center will operate in the case of airplanes. Easily one of the most accessible cities in Western Europe, Brussels has become the meeting place of international aviation bodies.

In 1922 the Belgian Government voted a subsidy of 3,000,000 francs (French) or the equivalent of more than $579,000. The Belgian subsidy scheme was patterned after the French. One plan of distribution is based on the duration and distance of flights and another on commercial efficiency, with compensation proportionate

to gross receipts. Under the first plan there is provision for amortization or a subsidy for a fixed term of operation. The passenger fare must not exceed 1.25 francs per kilometer and as this maximum is reduced the subsidy is increased. The charge for freight must not be in excess of 0.02 francs per kilogram per kilometer.

In 1922 the SNETA (Société National Pour l'Etude des Transports Aeriens) subsidized by the Government, completed its period of temporary operation between Paris and London, Amsterdam and The Hague. This service is thus left to the British and the French, chiefly the French, as they are more heavily subsidized than the British. The Belgian Government is studying the establishment of a permanent air service.

Notwithstanding the above, it is evident that Belgium has a strong aviation policy, as reflected in industrial measures and appropriations. The tentative budget for 1922 showed a total for military aviation of 28,200,000 francs ($5,442,600), of which 8,400,000 francs ($1,621,200) are for new construction. Civil aviation appropriations for 1922 totalled 10,000,000 francs ($1,930,000), including 3,000,000 francs ($579,000) for subsidies and 445,000 francs ($85,885) for races, demonstrations, etc. At the close of 1922 there were ninety-eight planes, with 100 per cent reserves, in the military establishment.

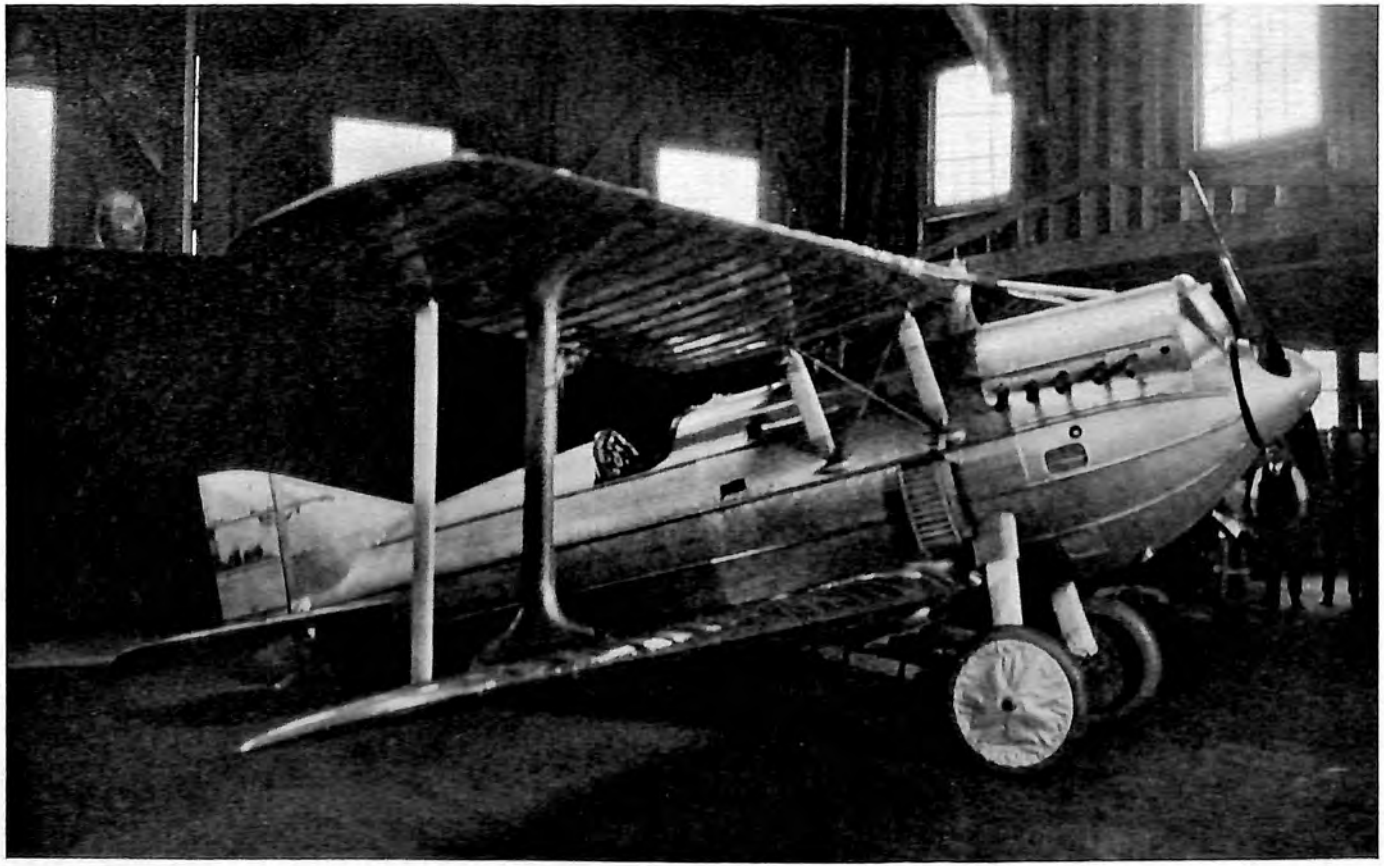
According to a report, November 10th, in the newspaper, L'Independance Belge, the S. A. B. C. A. (Société Anonyme Belge de Constructions Aeronautiques) is reorganizing one of its most important factories to four or five times its former size. The company has a capital of 5,000,000 francs ($965,000) and among its sponsors are some of the most important and powerful commercial and financial firms in Belgium. An agreement has been made with the Society whereby the Government agrees to place a minimum of 8,000,000 francs ($1,544,000) in orders annually. On May 1st, the Society had already received orders for more than 3,500,000 francs ($675,000) for fighting and training machines for the Army.

Bolivia

The French have been active in exploiting the Bolivian market for French flying equipment. Four machines were bought from France. The President and Minister of War are enthusiastic for the development of aviation. An airdrome is being constructed near La Paz.

Brazil

The year marked the one hundredth anniversary of the independence of Brazil. Impetus was given to commercial aviation at the



Gallaudet All-Metal Pursuit Plane.

Elias EM-2 Exp. Plane for U. S. Air Service.

Centennial Exposition in Rio de Janeiro, where sole flying concessions were granted the Curtiss Aeroplane Export Corporation.

Admiral Alexandrino Faria de Alencar, who was minister of the Navy in 1914 and 1918, was reappointed to that post. He is an aviation exponent and is regarded as responsible for the development of Brazilian marine flying. He is establishing an air coast patrol. Late in November the Government established a credit of about a quarter of a million dollars (U. S. currency) for the purchase of military airplanes. The Brazilian Naval Air Service is equipped almost entirely with Curtiss aircraft. The Air Service consists of 335 officers and men. The French mission has been active and in 1922 was instrumental in obtaining orders for thirty-two French planes.

The Executive Department has been authorized to establish two air lines between Rio de Janeiro and the city of Porto Alegre, Ro Grande do Sul. A large sum of money (reported as $5,000,000, U. S. currency) has been set aside for the purchase of equipment.

As against the aviation activity of European Governments, the United States in 1922 sent to Brazil a naval mission of fourteen officers, of whom but one was an aviator.

The Curtiss Aeroplane Export Corporation has an airdrome at Sao Paulo, but activities during 1922 were mostly transferred to Rio de Janeiro, where the one-hundredth anniversary of Brazil's freedom was celebrated with an international exposition. Orton W. Hoover, in charge of Curtiss work in Brazil since 1919, devoted most of his time to carrying passengers from the beautiful new station inside the exposition grounds and fronting on the harbor. This work was in connection with the Emprenza Aeronautica do Centenario, the only organization with the privilege of flying inside the exposition grounds. Two Curtiss *"Seagulls"* were used.

Canada

In 1922 a long-pending proposal for the consolidation of all Canadian defense forces—land, sea and air—into a Department of National Defense was acted upon. This department succeeds the Canadian Air Board, the Canadian Air Force remains, as previously, a separate service.

The appropriation for the Air Board for 1922-1923 was $1,600,000, a reduction of $625,000 from the previous year. In allotting the funds among the various stations every effort was made to maintain actual flying. In addition to the maintenance of the departmental organization on a somewhat reduced scale, arrangements were made to carry out Canadian Air Force Training at Camp

Borden; flying operations from Vancouver; High River; in the Lake Winnipeg District from a main base at Victoria Beach, and subsidiary bases at Le Pas and at Norway House; and at Ottawa. Operations on a repayment basis were to be undertaken by the British Columbia, Ontario and Quebec governments. For Ontario a practical test on a large scale in forest fire protection was carried out by the Laurentide Company from Whitney, with a sub-base at Parry Sound. For the Quebec Government, operations were again carried out at Roberval for forest ranging, survey and similar work.

In a report issued January 31, 1923, the Canadian Air Force stated the following: Air pilot licenses in force: private, 17; commercial, 25. Air engineers, 205; Air navigators, none; airship officer pilot, 1. Registration of aircraft: Civil, 50; Canadian Air Force, 79. Air harbor licenses: Civil, 23; Canadian Air Force, 7.

CHILE

In 1920 the British Government sent an aviation mission to Chile. The results of this sales work is seen in the purchase, in 1922, of much material from England. Graduates of the original British school are now training other cadets. The republic has 72 military pilots, 49 of whom were taught to fly by the British. The military equipment consists of 81 planes. Originally, 50 of these were given Chile by Great Britain.

The Curtiss Aeroplane Export Corporation is extending its activities throughout Chile and late in the year was negotiating for the establishment of an airdrome and flying school near Santiago. Plans were under way for an international aviation meet at Santiago in 1923.

One of the most notable achievements of the year was a flight of 2,100 miles made between August 29th and September 14th by Captain Diego Aracen Aracena of the Chilean Air Service. The flight ended at Ubatuba, Brazil, and was the longest yet made in South America. An altitude of 17,000 feet was reached, this being necessary to surmount the Andes.

CHINA

China, which has been the Asiatic military battling ground for centuries, is now becoming the scene of international commercial rivalry, one significant feature of which concerns aviation.

By agreement among the powers, importation of aeronautical material suitable for military use is ostensibly prohibited; the manner of the working out of this inhibition, however, is a question of some concern.

Factional troubles between North China, politically centered upon Peking, and South China, based at Canton, invited the use of aircraft in warfare. On at least one occasion, early in 1922, planes were used successfully to bomb Chinese war vessels.

It is reported that some time after the World War, the North China Government requested that an American aviation mission be sent to Peking. This mission was never sent, but, instead, one arrived from England. According to a British report, as of August 10th, the North China Government bought 100 Vickers-Vimy bombers and 45 Avro training planes, Vickers receiving in compensation Chinese bonds, at 8 per cent interest, to the value of $10,000,000. Upon the failure of interest payments, British representatives are reported to have dismantled the planes.

In the Chili-Fengtian campaign of 1922, airplanes were used on both sides, the Chili rebels penetrating into the North China aviation base at Nan Yuan, a suburb of Peking, and stealing four bombers and six training planes.

American aviation interests have attempted to obtain business in China, but, lacking the political influence of an official mission, such as the British have, and handicapped further by a strict interpretation on the part of the American State Department of the munitions prohibition agreement, they have made no progress. Orders actually filled by the Curtiss Aeroplane and Motor Corporation reached the docks in China, but the planes, of the slow, training, non-military type, were not permitted to take the air.

The Government of South China, under Dr. Sun Yat Sen, has been sympathetic to American aviation. The Commander of the Canton arsenal, General Chen Ying Shan, is a graduate of Yale. He has 30 aviators, most of them being American or Canadian trained, and ten planes, most of which are of American types. General Chen is increasing his flying force to fifty and is adjusting the Canton arsenal for the manufacture of aircraft.

In the confused political state which prevails throughout China, commercial aviation can make little headway, though the country, by reason of its topography, and the lack of surface transportation, is favorably inclined toward flying. An air mail and passenger service has been operated between Peking and Paitaiho, a North China summer resort, 200 miles distant. The fare one way is $40; round trip, $70.

Although the Germans, since the World War, have been deprived of political influence, they are beginning to be felt commercially and German pilots were more in evidence in 1922.

All told, there are about 171 planes in China, based mainly at Peking, Canton, Shanghai, Paotingfu, Mukden and Nantao.

Colombia

German interests, the first to exploit aviation in this Republic, continued to benefit from their pioneering. Transportation facilities are poor, great dependence being placed on the slow surface boats operating on the Magdalena River. For several years now the Colombo-Alemana de Transportes Aeroes has been operating seaplanes of German manufacture, and for the air service between Barranquila, Girardot and Nieva, the Colombian Government has been paying a subsidy of $100 a trip, plus a payment of 30 cents per fifteen grams of mail carried. One trip is made. Mail transported by river steamboat takes from one to two weeks from Barranquila to Bogota: by air the service is provided in 24 to 30 hours. On October 23rd the air service was extended to Cartagena.

The German company operates five seaplanes. From October, 1921, to January, 1922, inclusive, it reported 307 flights, aggregating 57,640 kilometers (35,823 miles), 303 passengers carried and 29,280 kilograms (64,416 pounds) of freight carried.

Costa Rica

Attempts are being made by Italian aviation interests to establish commercial aeronautics.

Cuba

Cuban aviation is wholly military. The personnel consists of 18 officers and 98 men. Of the officers, 8 are pilots. Six Curtiss JN-4B planes constitute the present equipment. Captain Manuel Reyes is the head of the air service. Appropriations have been practically nil, but the President, in his annual message, commented on the growing world-wide importance of aerial navigation and declared that provisions would be made in the next budget for an aviation section of the Government.

Havana is one of the terminals of the largest aerial transportation company in the world, operating flying boats. For the last three years the Aeromarine Airways, Inc., has maintained a commercial service between Havana and Key West, Fla. Starting with an eleven passenger cruiser in 1920, this service has grown so rapidly that today it is unquestionably the leading over-water air transportation enterprise.

Much of the success achieved by Aeromarine is due to the sympathetic public support manifested by the people of Cuba, who have patronized the service liberally from the outset, and who regard the

75-minute service with the mainland as one of the island's leading inducements to tourists.

In addition to the Key West-Havana line this company operated from Miami to Bimini and Nassau in the Bahamas. In the winter of 1920-21, 1922-23 the company maintained a daily passenger service upon regular schedule. United States mails are carried between Cuba and Florida.

During the year 1922, 268,535 passenger miles were flown in 744 flights and 2,399 passengers carried on the Southern Division (the West Indies) of Aeromarine Airways. More than 1,000,000 passenger miles have been flown all told and over 20,000 passengers carried during the three years of operation. The distance between Key West and Havana is 100 miles over open sea and the regular time for this flight is 75 minutes. The type of craft employed include the eleven-passenger Aeromarine flying cruiser and the six-passenger Aeromarine-Navy HS open cock-pit type of flying boats. More than a score of these aircraft are attached to the Southern Division of Aeromarine.

Aside from Aeromarine, the only other attempt at flying in Cuba, commercially, was made by individuals representing Junkers-Flugzeuwerk of Dessau, Germany, who announced, late in 1922, that a seaplane service, with German equipment and personnel, would be established throughout the West Indies. Two planes arrived. The public reception was cold and on the official opening flights the only passenger was the German ambassador. Announced plans were cancelled when one of the planes was wrecked. It is understood that further proposed shipments were canceled.

Czecho-Slovakia

Czecho-Slovakia, the largest independent nation to be set up after the German collapse, has the unique record of attaining a position in credit more substantial than that of many other and some much larger powers engaged in the war. It is significant that the Government, pressed with demands for new construction, physically and legally, should regard aviation as a distinctly desirable element in the military and economic life of the country.

Pre-war sympathy with France led naturally to post-war agreements in aviation and the French desire to radiate French controlled and operated air lines throughout Europe met sympathetic response in Czecho-Slovakia when the service to Prague and Constantinople was proposed (see France, this chapter). This company, the Franco-Rumanian Aerial Navigation Company, is subsidized by the

Czechs, as well as by the French, 5,000,000 ck. ($1,000,000) being paid yearly by the former.

The Prague Government's policy is to develop a national aircraft industry. To this end a tariff has been imposed upon foreign motors. The Czech industry was irritated when the Franco-Rumanian Navigation Company established its own repair stations within Czecho-Slovakia and partly as a result of this situation, though mainly through patriotic desires, Czech banks underwrote the Czecho-Slovak Aerial Navigation Company on May 2d, with a joint stock capital of 6,000,000 crowns, subscribed as follows: Legionnaires' Bank, 2,800,000 crowns; Moravian Agrarian Bank, 1,000,000 crowns; Bohemian Industrial Bank, 1,200,000 crowns; Bohemian Agrarian Bank, 500,000 crowns; Falco Company (Italian Aerial Navigation Company), 500,000 crowns. It is proposed to operate between Prague, Vienna and Berlin. It is understood that preparations for such service have already been made in Germany, pending permission to make international flights which, under the Versailles Treaty, was to have been given in 1922 (see Germany, this chapter). It is reported that the Czech Ministry of Public Works, which has charge of civil aviation, has recommended a subsidy of 1,500,000 crowns.

The Ministry of Public Works is developing a civil air port at Kbely, near Prague. A deficit of 60,000 crowns has been met by gifts from President Masaryk and the Ministry. The Ministry of Social Welfare is also encouraging civil aviation through its Automobile and Flying Department. In 1922 9,080,000 kr. ($1,816,000) were voted for aviation, an increase of 2,230,000 kr. over 1921. Of this amount 6,000,000 kr. ($1,215,600) is a subsidy for the Franco-Rumaine company and 3,080,000 kr. ($624,008) is for the construction, upkeep and improvement of landing fields. Lieutenant Colonel Engineer Kalarik is Chief of the Aviation Bureau.

The Congress on International Air Navigation met at Prague, September 25th-October 1st. Sixteen foreign countries were represented, including the United States. The result was the formulation of an international air code.

Denmark

April 1st an air mail service was opened between Copenhagen and London, making it possible for mail posted in London in the evening to be delivered in Copenhagen on the afternoon of the following day. Operation is in the hands of a Danish company. Connections are made at Copenhagen with Amsterdam and Rotterdam. The Danish Government has promised a subsidy of 100,000 crowns for an air

service between Copenhagen and Hamburg. It is understood that as a result, the Danish Airship Company is to operate a daily service for mail and freight, three planes being provided by German interests and three by Danish. Three hundred kilos of goods can be transported daily. Denmark has 88 aviators and 12 commercial craft.

Dutch East Indies (Netherlands)

The Colonial Government maintains an air force of six squadrons of six planes each, with 100 per cent reserves.

Ecuador

The Government has contracted jointly, it is reported, with France and Italy, for the development of the air service. From Italy sixteen planes have been purchased. The Government has made appropriations for two flying schools, one at El Condor for beginners, and the other at Duran for graduates. Instruction is in both land and sea types. During 1922 two hundred cadets were enrolled.

Egypt (British Empire)

The Royal Air Force mail service between Cairo and Bagdad has been extended to Palestine. Officers of the Royal Air Force have been lent to the Egyptian Ministry of Communications to advise on aviation.

Esthonia

At Reval is a car and locomotive factory engaged in the past principally in manufacturing equipment for Russian railways. It is understood that this plant in 1922 obtained a contract to build airplanes, the contract being guaranteed by the Deutsche Bank of Berlin. German motors, understood now to be stored in Denmark, are to be used.

Esthonia has awarded a concession for an air service with Stockholm, Riga and Petrograd. The leg between Reval and Riga is in operation. Fokker monoplanes are utilized. Planes leave the terminii twice a week. The service connects with the air line from Riga to Danzig and Danzig to Berlin. The fare from Reval to Riga is 6,000 Esthonian marks (about $15 early in 1922).

Finland

Finland has established an aviation policy looking toward a national industry. At Sveaborg, outside Helsingfors, a factory has been erected and early in 1922 the first craft were completed—mono-

planes equipped with Italian motors purchased in France. The factory has a production capacity of 30 planes a year.

Government aviation appropriations for the fiscal year 1922 were 15,000,000 Finnish marks, of which 4,500,000 marks are for new construction. Military, Naval and Marine aviation is under the Chief of the Army. Civil aviation is under the Ministry of Commerce. November 6th the Government submitted to the Diet a proposition concerning air traffic, and designed to bring about closer co-operation with Scandinavian nations and to intensify development in Finland.

Two commercial companies have been operating in Finland, providing irregular service between Helsingfors, Reval and Stockholm.

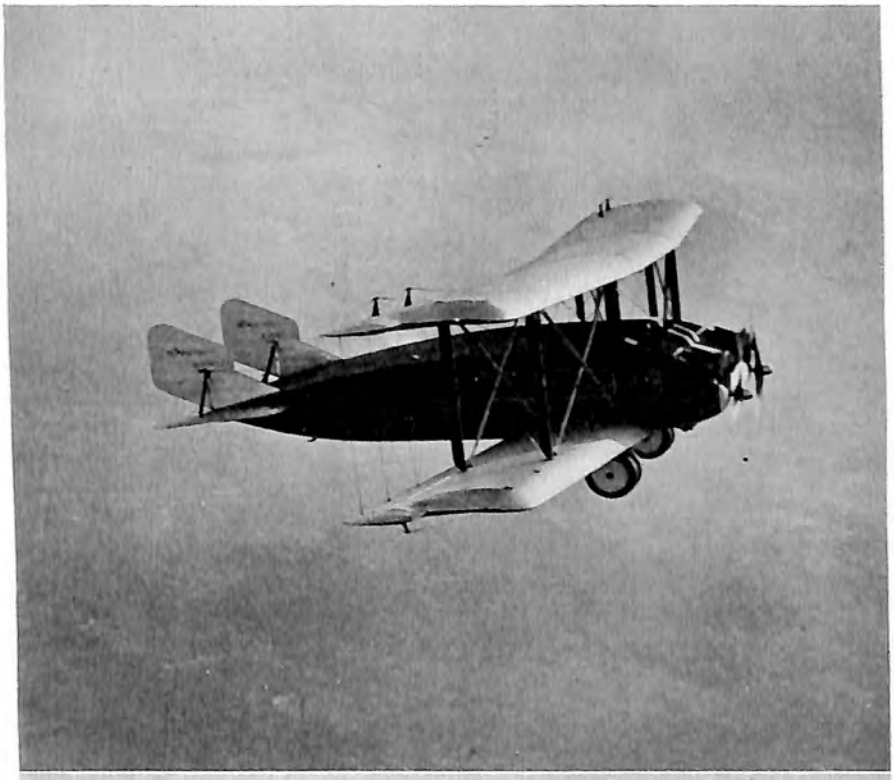
France

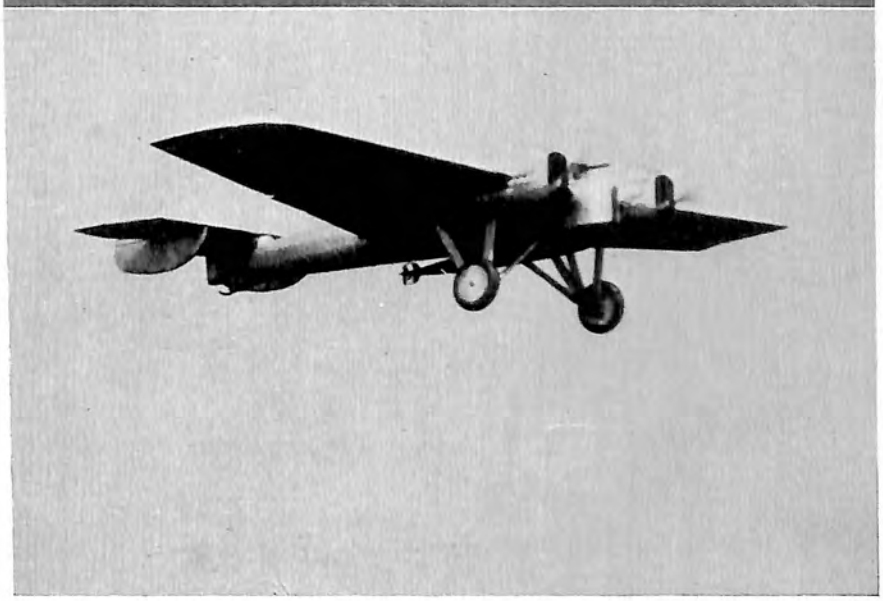
The aeronautical situation in France may be epitomized in the statement that, during the first eleven months of 1922, 3,300 airplanes were constructed for military and civil purposes. In August, 1922, additional orders were let for 1,200, it is understood. This means, simply, that France has expanded the industry built up during the war with Germany and thus stands better prepared today, in the matter of aerial defense, than she did on November 11, 1918.

The reason for this state of preparedness is—Germany. In the German section of this chapter are set forth the various rulings isued by the Allied representatives, all interpreted in the European press as based upon culpability on Germany's part in failing to observe the aeronautical sections of the Treaty of Versailles. Undoubtedly, the compelling motive in the French military policy has been partly a fear of German restoration to power, with consequent peril to France and partly forethought (extending over the last four years) as to the time when further occupation of German territory might be necessary.

Apparently, in the French mind, aviation is the key of the republic's defenses and this conviction is reflected in the remarkably flourishing state of the aircraft industry, in the impressive international scheme of subsidized air lines (each drawn with an eye to military utility and each by requirement operating equipment capable of quick conversion to some form of military use) and, of course, in the vigor and extent of the French air service itself. Policies which have been much discussed by the press and politicians in the United States and Great Britain, have, in France, actually been put into operation, with the result that the latter country today is in fact the *Master of the Air.*

An interesting sidelight is found in a press dispatch to the Phila-





Two Experimental Types. Remington-Burnelli Airliner. *Below*—Stout All Metal Torpedo Plane.

New Jersey and New York are to be connected under the Hudson with a vehicular tunnel. In determining the proper location of entrances and plazas, the commission in charge of this work, have many times used aerial photographs, like the above.—Photo, Fairchild Aerial Camera Corp.

delphia Public Ledger, from its Paris correspondent, who had just returned from a tour of *airdromes in Belgium*. "Everything that is newest and most up-to-date in French bombing planes," he wrote, "can be seen in the sheds. Giant planes, mostly all metal, or tiny wasps for reconnaisance and attack, constructed for lightness and speed, are the types of craft selected. Naturally at the present hour the old-fashioned censorship is not operating in the enlightened nations of Europe. But it is doubtful whether the figures of the exact number of planes and airdromes would receive official sanction in a dispatch to a newspaper, even of a friendly power—again taking consideration of the gravity of the present hour." The French, of course, are utilizing Belgium as the point of air operations for their forces on the Rhine and in the Ruhr, and, in addition, find a certain tactical advantage in such operation due to the fact that, from the Flemish plains, France could effectively use its aerial arm in any quarter of western Europe.

Writing in *U. S. Air Service Magazine*, February, 1923, under the title "France—Master of the Air," Major L. H. Brereton, formerly U. S. Air attache at Paris, stated:

> "Today France is the foremost military nation of the world and in defensive warfare could, no doubt, hold her own against any combination of two powers. It is realized, however, that her future military importance cannot be maintained at its present value and with this fact in view Germany again becomes a menace to her existence. As the military power of France diminishes, it is considered essential by the General Staff that her air power increase and to that end more concentrated energy, time and money are being expended on aviation than on any other military project, considering the present importance of the military and commercial air service as compared to other arms of the military machine."

The normal number of aircraft carried by a French squadron is ten. Plans for 1923 called for 220 squadron, or an immediate service fleet of 2,200 planes. Add to this the usual 100 per cent reserves, and remembering that the building program is steadily being carried out, and some idea as to the potential air strength of the republic is obtained.

To maintain upon a rising scale such an establishment, and also to nurture the commercial enterprises of private companies, requires money, and total French air and allied appropriations consequently were greater in 1922 than, possibly, the United States, Great Britain, Italy and Japan combined. In fact, they amounted to a grand total of 438,299,252 francs or $84,591,755.63, at normal exchange. This figure was divided as follows: War Department, 248,797,282 francs ($48,017,875.42), of which 57,462,700 francs ($11,090,301.10) was

for new construction; Navy Department, 37,300,000 francs ($7,198,000); Colonial Department, 4,001,000 francs ($963,263); Ministry of Public Works, 147,210,970 francs ($28,411,717.21), including 45,382,000 francs ($8,758,726) for subsidies, and 30,826,000 francs ($5,949,418) for flying fields.

In July, 1922, the personnel of the French air service was given as 1,300 officers and 15,000 enlisted men. During the first six months of 1921, there were 2,356 civil pilots admitted to the air training schools. These pilots are available in emergency. Naval aviation, in 1922, included 160 officers and 2,550 enlisted men. Flying equipment included 144 planes, two rigid airships and six non-rigid airships.

The air organization in France is divided among the services, but a distinct trend is noted toward centralization. Strong recommendations in favor of an autonomous air service have been made by M. Fabre, Reporter to Budget; General de Castelnau, M. Flandrin, former Under Secretary for Air, and others. A degree on centralization in certain services, especially those common to both commercial and military aspects, has already been achieved in the Ministry of Public Works, in which is the Under Secretary for Aeronautics. The incumbent of this office is M. Laurent-Eynac, a member of the Chamber of Deputies, an aviator, and formerly director of the French Petroleum and Gasoline Supply Services. Under him are four sections, 1, technical; 2, fabrication; 3, meteorological, and 4, air navagation. M. Laurent-Eynac also distributes the civilian subsidies, which have been steadily increased since authorized in 1920. In recent public statements, the Under Secretary said:

"We have two services which deal with airplane construction and operation. One is devoted to supervising the building of airplanes and motors, to increasing their efficiency and to extending the industry in every possible way. The other has to do with research work in aviation, motor construction, the study of the air as regards to flying through it, and to all matters of transportation and armament."

Mr. Eynac emphasizes the importance of the air mail as follows: "During one month we carried as many as 40,000 or 50,000 letters from Toulouse to Casablanca, which means a saving of five days for every letter. The weight of the Morocco mail in one month runs up to almost a ton. The amount of mail and freight on all of our lines is rapidly increasing. The French companies alone in 1919 carried about seven tons of merchandise and less than 1,000 pounds of mail. In 1920 the freight increased 700 per cent and the mail about 800 per cent. Last year (1921) we have three times as

much freight as we had in 1920 and the mail was more than eighteen times that of 1919."

As to general activities, Mr. Eynac said: "In 1919 there were four French companies which carried 558 passengers and 988 voyages, covering a distance equal to about seven trips around the world. By 1920 the companies had doubled the number. They had made about 2,400 trips and flew more than 500,000 miles, or over twice the distance from the earth to the moon. During that year we more than doubled the number of passengers and had seven times the amount of freight. The results in 1921 were even more remarkable. We then had nine companies which made more than 6,000 trips and covered more than 1,500,000 miles. The numbers of our pilots and mechanics have increased in proportion."

As to subsidies, the Under Secretary declared: "We shall have to continue to subsidize our air industry for some years to come, for we believe it will pay in the development of our commerce and in the national defense of the republic."

In three years French aviation activities have developed in an aerial net the lines of which, on December 31, 1922, exceeded 10,000 kilometers (6,215 miles). The annual development is as follows:

1920—Kilometers flown, 853,959 (530,738 miles); passengers carried, 1,379; merchandise transported, 48,100 kilos (105,820 pounds); mail transported, 3,925 kilos (8,635 pounds).

1921—Kilometers flown, 2,353,455 kilometers (1,462,681 miles); passengers carried, 9,427; merchandise transported, 166,490 kilos (366,278 pounds); mail transported, 9,481 kilos (20,858 pounds).

1922—Kilometers flown, 3,453,291 (2,146,234 miles); passengers carried, 14,397; merchandise transported, 529,644 kilos (1,165,216 pounds); mail transported, 41,173 kilos (90,580 pounds).

The French Government pays subsidies to lines operating over the following routes:

Paris-London.
Paris-Brussels-Amsterdam.
Paris-Strassbourg-Prague-Warsaw.
Toulouse-Rabat-Casablanca.
Bayonne-Bilbao-Santander.
Bordeaux-Toulouse-Montpelier.
Saint Laurent-Cayenne.
Saint Laurent-Inimi.
Antibes-Tunis.
Bucharest-Constantinople.
Oran-Casablanca.
Algiers-Biskra.
Dakar-Kayes.
Montpelier-Marseilles-Genoa.

Following are the principal French operating companies; with their equipment:

Compagnie des Messageries Aeriennes, 49 planes, operating between Paris-London, Paris-Brussels, Paris-Havre, Paris-Marseilles, and Lyons-Geneva.

Grands Express Aeriens, 9 planes, operating between Paris-London, Paris, Lausanne and Geneva.

Franco-Roumaine, 79 planes, operating between Paris-Warsaw, Prague-Budapest, Bucharest-Constantinople.

Compagnie Generale d'Entreprises Aeronautiques, 64 planes, operating between Toulouse-Casablanca, Casablanca-Oran.

Compagnie Aero-Mavale, 3 planes, operating between Antixbes-Ajaccio, to be further extended to Bizerte.

Campagnie du Reseau Trans-African, operating between Algiers-Biskra.

Campagnie des Transports Aeriens Guyanais, operating between Saint Laurent-Cayenne and Saint Laurent-Inimi.

The French were quick to recognize the necessity for international and colonial communications. All their air services have been devised accordingly. It is their intention to connect their Mediterranean possessions in the east and west with a line between Casablanca and Tunis, passing through Oran and Algiers. From this trunk line, other lines will branch off toward the center of Africa. Western Africa, Guiana and Indo-China will be similarly knit.

Even as satisfactorily as the existing subsidies have operated, consideration is being given for improvement. The present form is based on the distance flown, freight carried, and general safety. The contracts granted to companies have heretofore had a maximum duration of ten years. The Under Secretary is now studying plans for extending the concession periods to 30 years and providing for exclusive concessions within certain districts or over certain routes, the latter in order to avoid ruinous competition. The routes especially under consideration are those between Paris and London, Paris and Constantinople, and Toulouse and Casablanca. If legislative support can be secured for the thirty-year concessions now under discussion, it is hoped also to secure arrangements by which the state guarantees a low rate of interest on the capital invested in exchange for a share in possible profits of operation. This guarantee will not, however, under the plans now urged, involve the abolition of present premiums granted. What is intended is to bring the aerial companies into substantially the same relations with the state as now apply to the railroads.

In commenting upon the French colonial communication scheme, M. Eynac has said: "In the future we contemplate to establish liaison between Paris and the Far East through aerial lines. * * *

The realization of this program will be the best illustration of the peaceful expansion of French influence over the whole world."

The French air policy has been voiced by Marshal Foch in the following words:

"The military mind always imagines that the next war will be on the same lines as the last. That has never been the case and never will be. One of the great factors in the next war will obviously be aircraft. The potentialities of aircraft attack on a large scale are almost incalculable, but it is clear that such attack, owing to its crushing moral effect on a nation, may impress public opinion to the point of disarming the Governments and thus becoming decisive."

In harmony with the Marshal's warning comes the following expression, attributed to M. Chretien, concerning the air menace which he believes still exists in Germany. Although similar statements have been made in the past, the Chretien booklet bears the stamp of official approval from Foch, M. Flandin, M. Michelin and General Niessel, commander of the Ninth French Army Corps. According to Chretien, the world will some day see a huge battleplane, pilotless and conducted solely by wireless from a base possibly 2,000 miles distant. Such control may even be linked in such a way that from one series of vibrations a veritable armada of planes loaded with high explosives, gases or incendiary compounds, may be sent from Berlin, and, when hovering over Paris, by merely pressing a button in the central control office in Berlin, their burden may be suddenly released.

An examination of the aviation reports in the smaller countries of the world, particularly those in Southeastern Europe and in South Africa, reveals an astonishing French activity on behalf of aviation. While the French have been bold enough to proceed with direct appropriations for the development of an aircraft industry and the subsidization of commercial lines, they also realize that they can best recoup by selling the products of their factories to other countries or carrying the goods and people of other countries in French-owned and operated craft. This far-seeing policy is meeting with results.

Interesting comment on the general French alertness is made in a report from the American vice-consul in Paris, dated November 20, 1922, as follows:

"That the Government is deeply moved in this direction (dominion in the air) is shown by the instruction which is being given at the Sorbonne and in the schools, and by the encouragement which they give to aviation in every legitimate direction. They are realizing that it is not only by trials and contests in the field that success is to be obtained, but also by experiments

and tests in the laboratory, and that it is necessary to have a corps of trained and efficient men capable of making any experiment which may look feasible. They realize that it costs a great deal of money to do this work properly, nevertheless the best thinkers believe it must be done and not be too long delayed."

A further step along the line indicated was to plan for dispatching, in 1923, a French flying mission around the world. The trip was to require two years and arrangements were being made for 100 propaganda demonstrations in Egypt, Syria, Mesopotamia, Persia, India, Siam, Gambodia, Indo-China, Korea, Japan, Africa, Spain and the various countries of North Central and South America.

The air port for the City of Paris is Bourget. Latest figures available are for the month of March, 1922, when there were recorded 315 airplanes, carrying 846 passengers and 21,908 kilos (48,198 pounds) of freight. The corresponding figures for March, 1921, were 250 airplanes, 681 passengers and 8,725 kilos (19,195 pounds) of merchandise.

The French held, in 1922, the most impressive of all international aero shows. The salon was predominantly French and what impressed American visitors most strongly was the military character of the majority of the craft and equipment on display. Alive to the necessity for educating the public mind to a sense of the commonplace in air travel, the salon devoted careful attention to propaganda on safety and diversion. It was possible for the visitor to traverse long corridors and see in miniature the air routes of the world (most of which the French now operate) and to be instructed as to how an airplane is dispatched, maneuvered, landed, and what precautions are taken for the passenger's comfort and safety.

An important work along this line is being conducted by the Comité Francais de Propagande Aeronautique. France has carried on an intensive post-war development in the design and construction of planes, but to date has been utilizing mostly war-time engines. The demand is universally felt for engine improvements and the Comité, together with the Government aviation technical bureau and the Aero Club of France, is arranging for an engine design contest open to manufacturers of all nations belonging to the League of Nations. A prize of 2,000,000 francs is offered. The features aimed at are high speed and economy.

GERMANY

The aviation situation in Germany should be regarded, first, in the light of fulfillment or disregard of the Versailles Treaty, and, second, with relation to the realignment of the European powers,

whereby France, still fearful of a German revival of power and bitterly disappointed over reparations, has sought to suppress German flying, and England, for commercial reasons, displays a remarkably altered attitude toward the late common enemy.

It is possible now for the first time to give a clear resumé of the international political phases of German aviation since the World War. Articles 201 and 202 of the Treaty of Versailles dealt with matters aeronautical. Article 201 forbade the manufacture and importation of aeronautical material in Germany during the six months following the going into effect of the Treaty. Article 202 required the delivery by Germany to the Allies of all military and naval aeronautical war material within three months after the going into effect of the Treaty. The Treaty went into force on January 10th, 1920, thereby fixing July 10th, 1920, as the date for the resumption by Germany of the aircraft industry.

The Inter-Allied Air Service Commission (Interallierte Luftfahrtueberwachungskommission) was created to carry out these provisions. Germany created simultaneously the Air Service Peace Commission (Luftfahrtfriedenskommission). German deliveries were not made within the period fixed by the Treaty. At the end of June, 1920, according to the White Book of the German Government re Negotiations at Spa, Germany claimed to have delivered and destroyed 5,350 airplanes and 13,600 motors. On the ground that Germany had not made full deliveries, the Supreme Council, at Boulogne, on June 22, 1920, forbade the manufacture and importation in Germany of aeronautical material until full deliveries were made. At the end of 1920 Germany claimed to have delivered and destroyed about 14,000 planes and 27,000 motors, along with all airships.

After the Paris Conference on January 31, 1921, the Supreme Council demanded the airships *"Lake of Constance"* and *"North Star"* in payment for the ships sunk at Scapa Flow. Observance of the Boulogne decision of June 22, 1920, was also demanded, along with recognition by Germany of an allied definition of military planes, as opposed to non-military planes, as well as recognition of a continuing allied supervision of the German aeronautical situation.

On May 10th, 1921, Germany accepted the London ultimatum. One provision of this document was the definition of a military airplane, that is, one exceeding in its performance the following limits: if a one-seated, 60 horse power, and if seating more than one, 170 horse power, in either case capable of attaining an altitude of over 4,000 meters (13,123.36 feet), and a maximum speed

of 170 kilometers (105.57 miles) an hour at a 2,000-meter (6,561.68 foot) altitude.

Late in 1921 the German Reichswahr Ministry gave the following ostensibly final accounting of war aeronautical material:

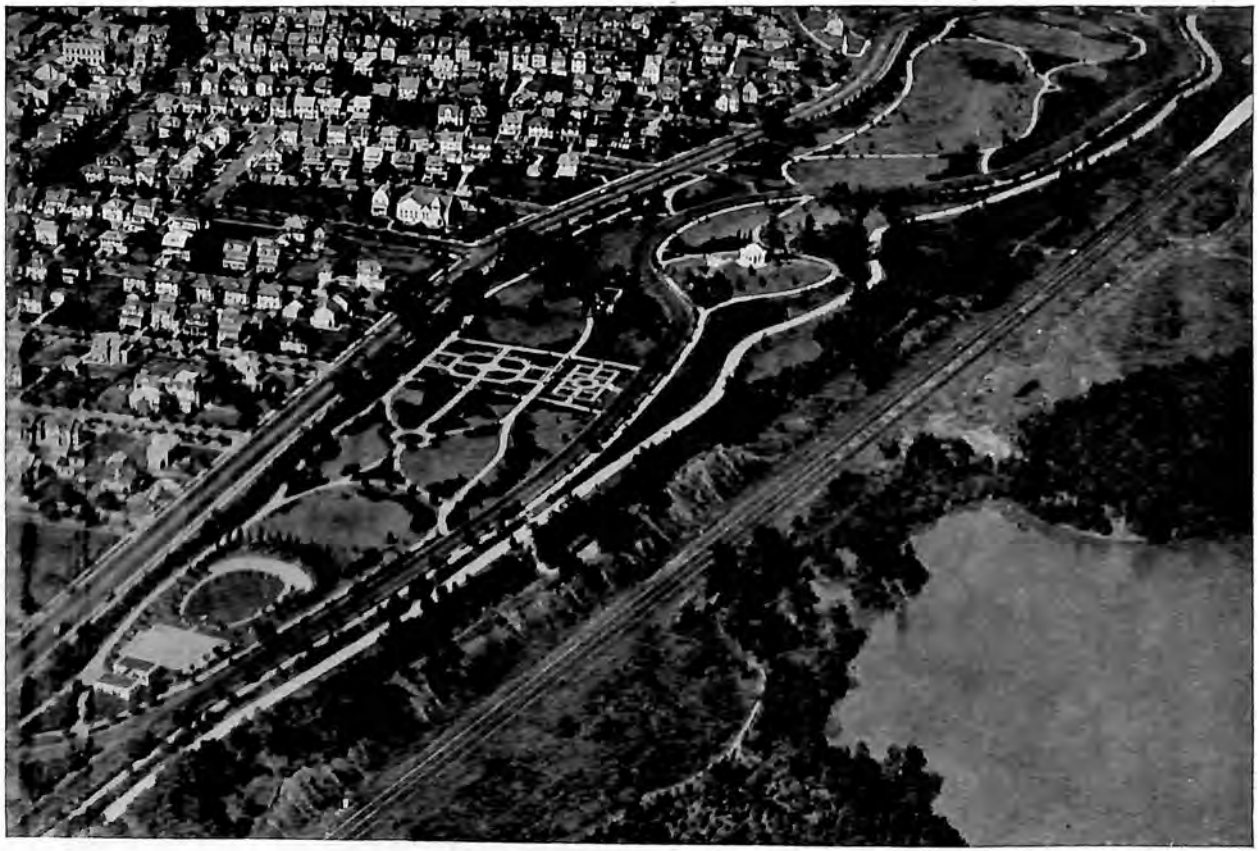
STATUS OF AERONAUTICAL MATERIAL TURNED OVER TO THE ALLIES UP TO THE CLOSE OF 1921

	Delivered to Allies	*Destroyed*	*Total Disposed of*
LAND—516			
Planes	574	14,193	14,767
SEA—58			
Dirigibles	8	3	11
Balloons	24	65	89
Motors	4,096	25,163	29,279
Hangars—Depots	116	196	312
Guns	656	7,749	8,405

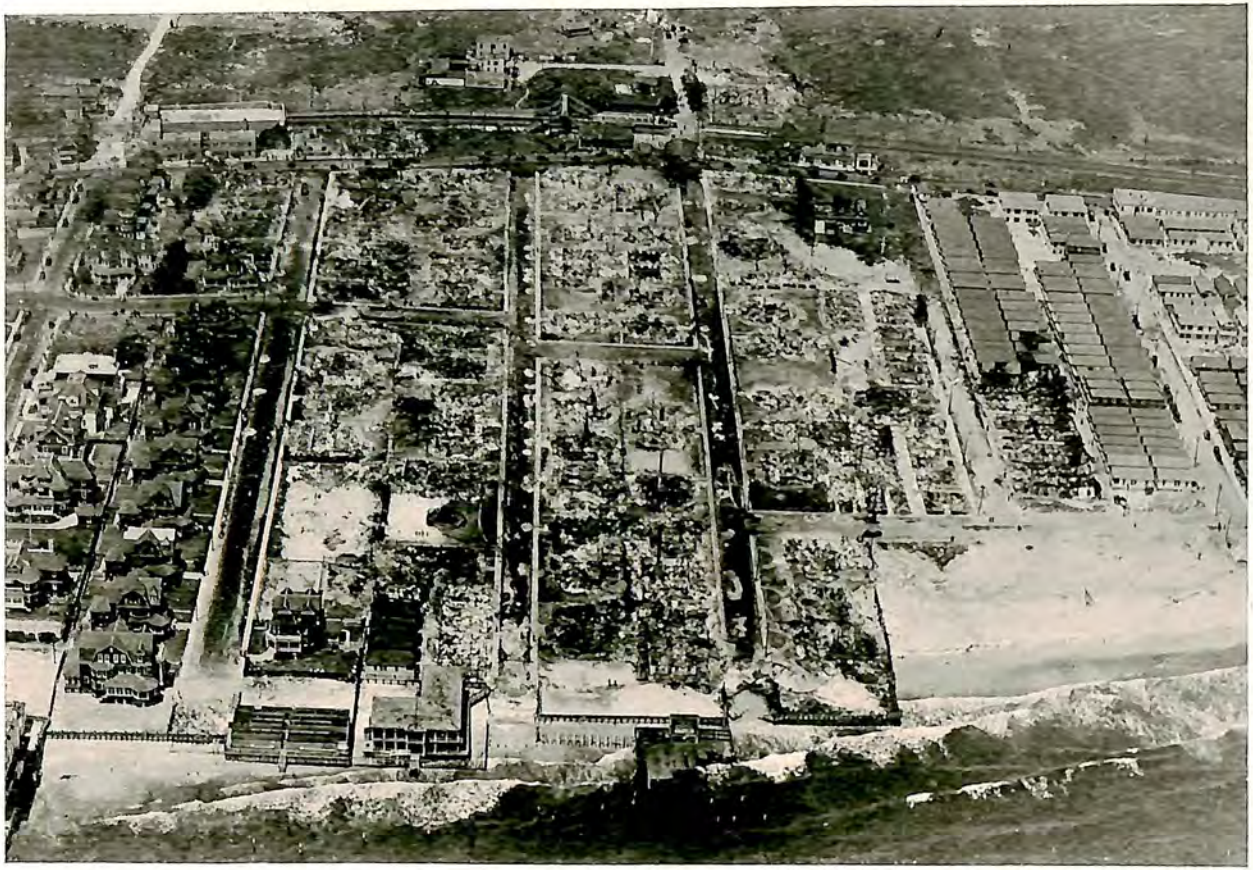
ACCOUNTING OF ALL AERONAUTICAL MATERIAL MANUFACTURED IN GERMANY DURING THE WAR (AS OF OCT. 28, 1921)

	Airplanes	*Engines*
Total built during war	48,386	44,286
Destroyed or surrendered	14,001	27,663
Used or destroyed during war	26,000	8,500
Delivered during war to German Allies or Neutrals	1,000	1,170
Delivered at time of Armistice	2,600	2,600
Left behind on front	3,000	2,500
Lost in Baltic Expedition of 1919 and during German internal disorders of 1919-1920	649	589
Sold to foreign countries since Armistice	1,000	1,000
Remaining undelivered in Germany	136	264
	48,386	44,286

According to the Berlin press, on Feb. 1st, 1922, the Conference of Ambassadors, sitting at Paris, agreed that Germany should be permitted to resume the construction of commercial types of aircraft after May 5th, 1922, providing certain restrictions were observed. According to the American Commercial Attaché at Berlin, the Ambassadors, sitting at Paris, issued a note under date of April 14th, 1922, whereby the above-mentioned restrictions were specified. These amount to a prohibition against building an airplane capable of better than a 3½ or 4 hour flight or a distance of more than 600 kilometers (372.6 miles). Rigid airships of more than 30,000 cubic meters gas content are likewise forbidden. A revision of these restrictions is contemplated after two years, so that the modifications which the progress of aviation demand, may be given consideration. The following translation of the restrictions is from the French text:



Always on the alert to keep the Parks of Newark as real beauty spots, the Commissioner of Parks has employed aerial photography as the only means of complete record. The above picture shows a portion of Branchbrook Park.—Photo, Fairchild Aerial Camera Corp.



The burning of hundreds of houses at Averne, Long Island, made an excellent subject for the aerial photographer. Fire Insurance Companies have used this picture to excellent effect, as have producers of non-inflammable roofing.—Photo, Fairchild Aerial Camera Corp.

RULES DISCRIMINATING CIVIL AIRCRAFT FROM MILITARY AIRCRAFT

(a) *Airplanes*

Art. 1.—A one-seater of more than sixty horsepower will be considered a military plane and thus war material.

Art. 2.—An airplane capable of flying without a pilot will be considered a military plane.

Art. 3.—Every airplane provided with armor plate or other means of protection, facilities for carrying armament of any kind—guns, torpedoes, bombs—and with aiming devices necessary for them, will be considered a military plane.

The following limits constitute the maximum for aircraft heavier than air, and all airplanes which exceed these limits will be considered military planes:

Art. 4.—The maximum altitude at full load, 4,000 meters (13,123.36 feet) (a high-compression motor will bring the airplane in the military category).

Art. 5.—Speed at full load and at an altitude of 2,000 meters (6,560 feet), 170 kilometers (105.57 miles), the motor at best efficiency and thus rendering the maximum power.

Art. 6.—Maximum carrying capacity for oil and fuel (the best quality for aviation use) shall not exceed 600x170 grams (————) per horsepower, Art. 5 being the speed of the machine at full load and power and at 2,000 meters (6,560 feet) altitude.

Art. 7.—An airplane capable of carrying a load of more than 600 kilos (1,320 pounds), a pilot, mechanic and instruments included, though the conditions under Articles 4, 5 and 6 are complied with, will be considered a military airplane.

(b) *Dirigibles*

Dirigibles, the cubic content of which exceed the following, will be considered military:

1. Rigid dirigibles, 30,000 cubic meters (1,059,420 cubic feet).
2. Semi-rigid dirigibles, 25,000 cubic meters (882,850 cubic feet).
3. Non-rigid dirigibles, 20,000 cubic meters (706,280 cubic feet).

Art. 8.—Factories turning out aircraft shall be registered. All aircraft and pilots, or pilot apprentices, shall be listed in accordance with the conditions provided for them in the covenant of October 13, 1919. These lists will be kept at the disposition of the guarantee committee.

Art. 9.—The stocks of aviation motors, and of spare parts and accessories, shall not be permitted in excess of what will be considered necessary to satisfy the needs of civil aviation. These quantities shall be determined by the guarantee committee.

The Guarantee Committee, above mentioned, is now functioning. On June 1, 1922, it informed the German Government that it was permitted to build twenty-two specified types of "civil" aircraft, with engines ranging from 25 to 230 horsepower. At the same time the committee informed Germany that technical regulations would, after Nov. 5, 1922, be applied without reservation to all aviation equipment.

Although permission for international flights was expected May

5th, 1922, there seems to be some doubt as yet as to whether these may be made.

According to the American Trade Commissioner in Berlin, Germany was permitted by the Inter-Allied Air Service Commission to retain 150 airplanes, but that by April, 1922, this number through deterioration had decreased to 100, which is all he estimates to be in operation. This is not believed by the Allied press to be the case, as the French and British papers (though the latter to a diminishing degree) continued in 1922 as in 1921 to see a new German peril forming in the air. Typical of the Allied comment is an article which appeared in the London Post, under a Paris date of December 15th, 1922. According to declarations by responsible French and Polish figures, the Germans are manufacturing planes and engines in Russia, ostensibly designed for commercial purposes but really capable of carrying cargoes of chemicals or explosives. Reference was made by the French manufacturer, M. Michelin, who has long been a liberal patron of flying, to a terrible new asphyxiating gas discovered by the Germans. M. Michelin is quoted:

"French defenses against aircraft are so weak that if enemy pilots were really courageous nine out of ten of their machines could reach their destination. The new gas is much more terrible than those hitherto known, and if an attack were made there would be a great possibility that the surprised population, possessing no protecting masks, would be to a large extent destroyed."

There is no question but that the German mind has been very active in aeronautical development. If it is true that but one hundred planes are officially in operation in Germany, then the results commercially achieved with these are phenomenal, or they have been increased in numbers. The terms of the Versailles Treaty and the manner of its enforcement have permitted the Germans to design in their own plants and manufacture outside. Manufacture of planes, engines and materials is reported, on what appears to be incontrovertible authority, in Switzerland, Italy and Russia and probably in Finland and the Scandinavian countries (see respective nations in this chapter). In addition, the Germans have been active against the time when all restrictions would be lifted in promoting German aeronautical enterprises in various parts of the world, notably in Asia, Soviet Russia and certain of the South American Republics.

Civil Aviation in Germany is under the National Bureau of Air Navigation. Despite the inflated currency and in curious contrast with the professed inability to meet reparations payments, sub-

sidies are paid air lines, the total appropriations for 1922 amounting to 22,000,000 marks. Provision is made for the payment of 10 marks per kilometer on routes up to 300 kilometers and 11 marks for those above that distance, providing the operators adhere to regular schedules and providing mails up to 100 kilograms are carried free. To qualify for a subsidy, an operator must have a minimum operating record of 20,000 kilometers (12,420 miles) a year; show a record of 80 per cent efficiency per month and *utilize at least one-third modern equipment.* The latter provision is especially interesting in view of the Allied restrictions. Ten per cent is deducted for each 5 per cent loss in punctuality.

The same financial and industrial conditions which inclined German commerce and industry into great post-war combinations tended to similar ends in aviation, so that most operations have been carried on by seven groups of which the Deutsche Luft Reederei and the Lloyd Luftverkehr Sablatnig are the largest. It is reported that the Hamburg-American and North German Lloyd shipping interests have investments in certain of the groups. In this connection reference should be made to the fact that, although the two above mentioned air combinations operate only airplanes, the steamship companies are also interested, respectively, in the promotion of the airship activities of Luftschiffbau-Zeppelin and Schutte-Lanz.

The five other chief operators are: Bayerischer Rumplerwerke, Deutscher Luft Lloyd; Lloyd Ost Flug; Bayerischer Luft Lloyd, the Paul Straehle Co. In the period April 1-October 31, 1921, the seven groups performed as follows: 1,654,000 kilometers (1,027,134 miles) flown; 6,820 passengers carried; 30,710 kilograms (67,562 pounds) of mail and luggage transported. Most of the traffic was between Berlin and the larger German cities and between Berlin and Holland, Latvia and Lithuania.

Germany's commercial flying program for 1922 aimed especially to develop connections with Russia and the Baltic states. Among the most striking changes in the year's program were the abandoning of the Berlin-Braunschwig-Dortmund and Bremen-Muenster-Dortmund air lines because of the small demand for the services they offered in competition with the railways. Out of 4,781 air kilometers (2,969 miles), included in the 1922 routes, 2,268 kilometers (1,408.42 miles) embraces routes connecting Hamburg and Berlin with the East—that is, by way of Stettin, Danzig and Koenigsberg to Kovno, Riga and Reval.

On May 1st operation was begun on an air mail line between Berlin and Moscow. Details are lacking, but it appears that Russian

and German financial interests have combined under the name of the German-Russian Air Transport Company. It is capitalized at 20,000,000 marks, 50 per cent being subscribed by the Deutsche Luftr Reederei and 50 per cent by the Russians. A Russian is chairman of the board of directors. The company has received a five-year exclusive franchise. The service is tri-weekly; the passenger fare, Koenigsberg-Moscow, was 16,000 paper marks (a mark as of May 5, 1922). Mail carried by air on this route gains four days. A postage surcharge of eight marks is imposed.

Air lines advertised to operate in 1922 were:

Copenhagen-Hamburg-Berlin-Dresden.
Berlin-Bremen.
Berlin-Hanover-Magdeburg-Leipsic-Dresden.
Berlin (Hamburg)-Stettin-Danzig-Koenigsberg-Kovno-Riga.
Danzig-Koenigsberg-Memel-Riga.
Berlin-Leipsic-Fuerth (Stuttgart)-Munich-Augsburg.
Munich-Constance.
Hamburg-Westerland.
Bremen-Wangeroog-Norderney.

May 15, 1922, the Fuerth-Nurnberg-Geneva route, with a landing at Zurich, was opened. It is operated jointly with the Swiss, making connections for Berlin and Munich.

A service between Berlin and Danzig via Stettin was opened May 5, 1922. The ticket charge of 870 marks was cheaper then than the fare by rail.

Beginning April 1, 1922, a daily mail, passenger and express service was re-established between Dresden and Berlin (air fare 500 marks, rail 285); Berlin and Hamburg (650 and 387); Dresden and Leipsic (500 and 190); and Magdeburg-Hanover-Bremen. The total air fare between Leipsic and Bremen is 1,300 marks as compared with 536 by rail. Fifteen kilograms (33 pounds) of baggage are carried free; excess at 15 marks a kilogram; April 1, 1922, the Bayerischer Luft Lloyd resumed the Munich-Constance daily service for passengers and mail. The passenger charge, one way, was 1,000 marks; round trip, 1,800.

The Deutsche Luft Reederei operates the Dresden-Berlin, Hamburg-Bremen-Amsterdam-Rotterdam; Hamburg-Westerland; Travemunde-Warnemunde-Sassnitz-Swinemunde; and other routes. During the three years, February, 1919-February, 1922, it made 11,726 flights. Of these 11,252 were completed as planned, without interruption, showing thereby an efficiency record of 94.1 per cent. Pass-

engers carried numbered 13,927; mails, 45,761 kilograms (100,674 pounds), and parcel post and luggage, 82,995 kilograms (182,589 pounds).

Providing necessary arrangements can be made between the Inter-Allied Guarantee Committee and the German Government, an arrangement is to be made by Daimler Hire, Ltd., the British company now operating between Manchester-London and Amsterdam, and Deutsche Luft Reederei for a through London-Berlin service.

Restricted though Germany has been from a physical standpoint, experimentation has continued. The German gliding and soaring flight tests startled the world and set other nations at work similarly. (See Chapter "Experiments in Gliding and Soaring Flights," No. XI). Forced to design within arbitrary limits, they have, in the opinion of some, been aided rather than handicapped. Although the subsidy paid their operating lines is about one-fifth the English and one-eleventh the French rate, the efficiency resulting is declared (according to friendly Berlin press correspondence) to be far greater proportionately. For every $1,000 or the equivalent in marks received by operating companies in 1922, German airplanes covered nearly 35,093 kilometers, as compared with approximately 11,132 and 1921. The same ratio gives 225 passengers carried, as against 45 and 1,906,-007 kilograms of freight as compared with 212.85 the previous year.

Luftschiffbau-Zeppelin has been under restrictions in both airship and airplane construction. To manufacture all-metal planes without Allied interference, a plant was established at Pisa, Italy. The past year the Zeppelins have been engaged in constructing a reparations dirigible for the United States Government (see Chapter VIII). They are collaborating with Spanish capitalists in the formation of a dirigible line between Seville and Barcelona. Through their American representative, Harry Vissering, of Chicago, Ill., they are establishing themselves in the United States.

Schutte-Lanz, as described in the Aircraft Year Book for 1922, has affiliated with the American Investigation Corporation and developments in 1922 indicated that the first of the ships to be used on the proposed New York-Chicago service would be constructed in the United States. (See Chapter VIII.)

On August 1, 1922, the Reichstag enacted a law regulating aerial traffic, the very basis of favorable recognition under which is German citizenship and German capital. Identical agreements have been made by Germany with the Netherlands, Switzerland and Denmark whereby planes of each nation may fly above the territory of the others without having first obtained permission.

GIBRALTAR (British Empire)

The huge rock fortress is reported being tunneled for hangar and repair space for an elaborate British air station.

GUIANA (British Empire)

The Colonial Legislature accepted the offer of the Bermuda and West Atlantic Aviation Co. to make an aerial survey and to this end appropriated $8,000. The work has been interrupted due to wrecking of the flying boat.

GUIANA (France)

The French Government is giving assistance to an air mail line operated up the Marowyne River, which is the boundary between French and Dutch Guiana.

GREAT BRITAIN

If Great Britain did not achieve the high hopes for progress in the air that were put forward in 1922 it was not due either to lack of desire or policy, but to the necessity for economy forced by liquidation of war debts at home and abroad.

Nevertheless the year 1922 was one of distinct progress. As outlined in the Aircraft Year Book for 1922 (covering the year 1921), all aviation in Great Britain is under the direction of the Air Ministry, though the controversy between the United Service exponents and the adherents to the theory of separate service (military and naval) is still being bitterly waged.

For much of the following data the editors of the Year Book are indebted to the British Air Attache at Washington, Wing Commander M. G. Christie. The personnel of the Royal Air Force numbers 3,000 officers and 26,500 men. Service equipment is reported as 360 planes. Approximately 75 per cent of the officers are qualified pilots. In the Royal Air Force there are thirty-three fully formed squadrons—21 overseas, as follows: 1 on the Rhine, 1 on the Mediterranean, eight in Iraq, 6 in India, 5 in the Middle East. Twelve squadrons are maintained in the British Isles. In addition to the 29,500 officers and men in the Royal Air Force, the Air Ministry employs 4,382 civilians.

Late in 1922 there was much discussion as to air preparedness in the Navy, it being asserted in certain of the newspapers that fewer than a dozen machines were available. Apparently dependable information has it that the Navy's equipment is 359 planes of various types. Seventeen battleships, 4 battle cruisers and 7 light

cruisers are equipped with flying platforms. The Navy also has the following aircraft carriers: the *"Argus"* and the *"Pegasus"* in commission; the *"Hermes," "Eagle"* and *"Furious"* under construction. The *"Ark Royal"* is in reserve. The *"Pegasus"* and *"Ark Royal"* are ex-commercial vessels of 3,300 and 7,450 tons, respectively. The "Furious" is 22,900 tons and, it is reported, is to be reconverted into a cruiser. The *"Hermes"* is 10,350 tons displacement.

In the last budget (1922) $54,475,000 was voted for aviation. Of this sum nearly $11,000,000 were for construction and well over $2,000,000 for civil aviation.

Estimates for air appropriations for 1923-24 reach a total of £18,605,000 or the equivalent, at normal exchange of about $94,000,000.

The British aircraft industry at the beginning of 1922 still suffered from war-time expansion and post-war contraction, and this despite post-war appropriations to ease off the production situation. The air policy was very much under discussion in Parliament and the press, and as a result of a nation-wide agitation in the middle of the summer, the Air Ministry announced orders for 500 machines for "home defense." The cost of this construction, evidently part of a year-by-year continuing program, was set at $10,000,000 per annum. The most significant features of the decision were the allotment of the orders among the substantial, going units of the British aircraft industry, and the declaration by those in authority that these extraordinary expenditures would not embarrass or interfere with the expenditure of appropriations normally made for the aviation defense of the empire or the development of its aerial commerce.

Examination of parliamentary debates and newspaper editorials reveals a curious cessation of apprehension with regard to German activity and an uneasy contemplation of the astonishing expansion of France in the air—this notwithstanding the fact that the British Government continued steadfastly along the lines of closest political co-operation with the French. The attitude was not one of distrust of the French, but of disappointment and chagrin for British shortcomings.

The Secretary of State for Air is Sir Samuel Hoare. Early in 1923, in presenting the Air Estimates for 1923-24, Sir Samuel made startling comparisons between the relative air strength of France and Great Britain. He declared that today the British peace-time air force was only one-tenth of its 1918 strength, whereas the French Air Force today was one-third of its 1918 strength. Moreover, two-thirds of the British machines were over-seas, while three-fourths of the French machines were in France. Under the present building

programs, he estimated that France in 1925 would have 2,180 airplanes and England only 575. He estimated that the application of the one power standard to the air would mean an immediate increase in the gross estimates for the British Air Service of 5,000,000 pounds, or an annual appropriation for the Air Service of 35,000,000 pounds (at normal exchange nearly $175,000,000).

The *London Daily Mail,* June 17, 1922, said: "By their neglect of the civil aviation, by spending on 'bows and arrows' money which should have gone to build up our first line of defense—the Air—the Government has brought down this country to a status which is not that of a first-class power in terms of modern arms."

"Civil flying," stated the *London Observer,* July 9th, "is the permanent and indispensable basis of air power. Without it we cannot hope to maintain, at any cost within our capacity to meet, the organization, the reserve of personnel, the progress in design, and everything that is summed up in the word experience, necessary to an air service on the scale which our geographical position requires."

Speaking officially, a short time afterward, Colonial Secretary Churchill deplored the British policy, hitherto followed, of spending most of the money available on strictly military and naval air projects. He declared that this was short-sighted and that the right and necessary thing to do was to build up the commercial flying reserves.

Speaking before the Over-Seas League, in October, Major General Sir W. Sefton Brancker, K. C. B., Director of Civil Aviation, observed:

"Air transport will pay in time. Even if it did not pay it is a necessity. If tomorrow you occupied new territory and wished to lay down a railway, or put in a cable or telegraph line, and some one proved to you that the railway would not pay for ten years, it would not stop you from doing the work. You will find the same applies to aviation, particularly in regard to the British Empire. We shall find we must have air transport between ourselves and the British Dominions. Whether it pays or not, we must have it. In the future, the British Empire can not remain as it is unless you quicken up your communications by means of air transport."

The existing British policy in the air may be regarded as epitomized in the foregoing words. Official commitment was had at the close of the year from the new Premier, Bonar Law, who, in giving details of the incoming Government's imperial policy, asserted that "the whole center of gravity was changing in the matter of national defense from the sea to the air."

In keeping with these enunciations were the application of the new scheme of British subsidies, which will be discussed hereafter,

and the first investigation by the Civil Aviation Advisory Board, under the direction of the Air Ministry.

In its first report, submitted in 1922, the committee dealt with air mail services in general and between the British Isles and India in particular. Among the conclusions it was stated:

"We can not forget that, whatever the military air reserve may be, the machines, pilots and personnel generally employed on Imperial Air Mail Services will form an additional reserve from which assistance could be drawn, in case of war, while the production of passenger and goods aircraft will keep the factories and designing staffs further employed and capable of more rapid expansion in case of need. . . . . We are, therefore, of the opinion that, if civil undertakings are making an efficient attempt to keep open the civil airways of the Empire by means of rapid and direct air communications, they can fairly claim a considerable measure of financial assistance from the Government until they have been able to establish themselves on a sound financial basis. It is difficult to envisage, from our comparatively small experience of civil flying, what the future may conceal under its veil, but it is sufficiently clear that a new and more rapid means of transport, which is bound to develop in rapidity and reliability, is now available for use as a means of bringing closer together the various parts of the Empire."

With the object of securing the best offers, the committee recommended that, when the route to be operated has been selected, an open tender should be advertised asking bidders to state the terms and conditions under which they would be prepared to maintain a service for the carriage of mails daily, bi-weekly or weekly, as may be decided upon, along the alternative routes stated in the advertisement, assuming a load of 500, 1,000 or 2,000 pounds of mail a week.

The specific air mail service which is most attractive to the British, both from the standpoint of imperial defense and commerce, is that to India. Three optional routes are being studied, one via Egypt, utilizing the R. A. F. route from Cairo to Bagdad; another via Constantinople and the third via Alexandretta. What is aspired to is an "all red" or all British route, which will be possible upon the development of a machine capable of making the non-stop flight from London to Malta, via Paris, a distance of 1,330 miles. The route favored is that via Egypt. Using airplanes flying at the rate of 100 miles an hour, the following are the savings in time effected, as contrasted with the best combination by rail and water: London to Constantinople, 2½ days; to Port Said, 2½ days; to Bagdad, 22 to 25 days; to Karachi, 9½ days; to Bombay, 6½ days; to Calcutta, 7½ days.

For the first nine months of 1922 a subsidy scheme was in operation which invited what was declared to be ruinous competition, especially on the London-Paris route. Feeling that a few strong systems

would be better than many weak enterprises, the Air Ministry, on October 1st, put into effect a radically new plan for payments which, in effect, created monopolies for Handley Page, Instone and Daimler, operating, respectively, over the London-Paris route (325 miles), London-Cologne (310 miles), and Manchester-London-Amsterdam (436 miles).

The following information on the British subsidy scheme for air transport during 1922 was obtained through the courtesy of the British air attaché at Washington:

"The scheme has two main applications, first, a purchase subsidy, and, second, an operational subsidy. As to the first, approximately one-half of the aircraft and engines of the subsidized companies have been provided by the Air Ministry. In 1923, 30 per cent of the companies' expenses for the replacement of machines will be borne by the Air Ministry, up to a maximum grant to each company of £15,000 ($75,000). As to the second, a lump sum is paid to each company on condition that a certain minimum number of flights or miles of flights are carried out during the year. In the event of any company failing to fulfill the requirements as to flights or miles flown, the grant is reduced pro-rata according to the deficit in flying.

"The operational subsidy grants for 1922 were made as follows:

"London-Paris Route: To Messrs. Handley Page Transport, Ltd., £15,000 ($75,000) in return for 300 efficient flights each way between London and Paris.

"London-Brussels-Cologne Route: To Instone Air Line, Ltd., £25,000 ($125,000) in return for 300 efficient flights each way between London and Cologne.

"Manchester-London-Amsterdam (Berlin) Route: To Messrs. Daimler Hire, Ltd., £55,000 ($275,000) in return for 250,000 miles flown in the course of efficient flights over the Manchester-London-Amsterdam (Berlin) route.

"Following are the general conditions: The companies are free to increase the frequency of the service beyond that corresponding to the number of flights or flying miles specified, but no subsidy is granted for such additional flying. An 'efficient' flight is one which is completed within a time limit corresponding to a minimum ground speed of 60 miles per hour. The insurance of machines and their equipment with wireless apparatus is compulsory. The tariffs charged by the companies must be approved by the Air Ministry. The Air Ministry reserves the right to amend the amount of subsidy, or to withdraw the subsidy if the service is unsatisfactory. The sum total of the subsidies paid by the Government for civil air transport is at present limited to £200,000 ($1,000,000) per annum."

Complete reports on the functioning of the three approved companies since October 1, 1922, are lacking, except in the case of Daimler Hire. According to figures supplied by the British Air Attache at Washington, covering the calendar year 1922, and embracing all civilian activity in the British Isles, 10,105 passengers and 215 tons of mail, freight and luggage were carried. The total mileage was 632,000 miles.

A clear picture of the situation, sectionally, is provided through the courtesy of Colonel Frank Searle, C. B. E., D. S. O., managing director of Daimler Hire, Ltd., and who is also an official of Birmingham Small Arms, parent corporation of Daimler Hire. Daimler has on charge four DeHaviland 34s, each equipped with one 450 h.p. Napier Lion motor. To qualify for the subsidy, Daimler must operate a minimum of 255,000 miles a year, which works out at a subsidy around $1 a mile flown. Under the regulations they are permitted to fly one-fourth of their mileage in the six winter months and three-fourths in the six summer months. In the month of October, Daimler carried 171 passengers, flew 11,231 miles and carried 27,863 pounds of goods, mostly newspapers on the London-Paris route which they had not yet relinquished. In November the record was 189 passengers, 12,457 miles flown, and 4,243 pounds of goods carried, including one pound of mail between Manchester and London and 150 pounds between Amsterdam and London. In December the bookings slumped to 64 passengers, the mileage increased to 13,432 miles and baggage stood at 4,006 pounds. No mails were carried between Manchester and London and only 25 pounds between Amsterdam and London.

Colonel Searle is a rail and motor transport authority, but his first experience in operating aircraft came when asked to take over Daimler Hire. He approached the problem solely as one of transport. He feels that his ground organization is the key to safe and economical operation. At the conclusion of each trip, the craft and engines are thoroughly examined, especially the gas and oil strainers, as these frequently indicate motor trouble before it develops. An instrument of great assistance in upkeep is known as the telemeter, driven off the engine, which records the speed in revolutions per minute, the altitude and clock time. A registering needle shows instantly when the r.p.m. diminish and by study and comparison it has been found possible to read this chart in terms of ignition fault, valve failure, etc.

Colonel Searle has found that it costs $16 a month for engine upkeep (including fuel and oil) and $5 a month for the plane. He says that an operator, to "get his money's worth" out of an airplane, must fly it a minimum of 62,000 miles a year. On the basis of 62,000 miles flown per year, it costs Daimler $1.15 per mile of flying; if operations are increased to 125,000 miles per year per machine, costs are brought down to 77 cents a mile; and if mileage is increased to 190,000 miles, costs fall to 64 cents a mile. These costs are figured on a strict commercial basis and include every charge applied to ordinary transport—interest on investment, overhead, depreciation,

insurance, etc. Daimler, it will be seen, operates just enough to come within the subsidy, picking up the extra 15 cents per mile from traffic.

The time by air from Manchester to London is 1 hour 55 minutes and the fare 2 pounds, 5 shillings one way or a book of 50 tickets for 100 pounds ($500). The air time from London to Amsterdam is 2½ hours, the fare 4 pounds. The time saved over rail and steamer is 11 hours. In each case the fare is identical.

Colonel Searle operates his engines for 150 hours, or 15,000 miles, without complete overhaul. It is his opinion that public fear of flying is the severest obstacle to be overcome. It is his company's intention to extend its Amsterdam line to Berlin shortly. This extension has been commented on in the London press as the "first link" in the air line to India.

The Instone Air Line, Ltd., which at first operated between London and Paris, operates now between London, Brussels and Cologne. This service is one of the many enterprises founded by Samuel Instone, who, in addition to being an industrial capitalist, also controls many steamship lines. The single fare from Cologne to London is 5 pounds 19 shillings 6 pence and the round trip, 10 pounds, 10 shillings. The rail and boat time, London-Cologne, is about 15½ hours; by air it is only 3½ hours. Since the establishment of the service, October 1, 1922, 237 passengers have patronized it.

No report is available from the British Air Ministry for the period subsequent to October 1, 1922, when the new "approved" subsidy scheme went into effect. The report of the Directorate of Civil Aviation covering the period October 1, 1921-March 31, 1922, shows a gradual increase in efficiency. A composite table of operations from May, 1919, to March, 1922, inclusive, shows that 82,347 internal (within the British Isles) and 4,441 continental flights were made, with an approximate, respective, mileage of 1,060,000 and 1,026,000 miles. Passengers carried within the isles numbered 139,527 and, on the continental routes, 12,601. Total goods carried amounted to 197.1 tons.

For the period, November, 1919-March, 1922, inclusive, there was the following air mail record: Estimated number of letters posted for—Paris, 103,451; Brussels, 31,348; Amsterdam, 33,476. Estimated number of letters received from—Paris, 52,493; Brussels, 20,835; Amsterdam, 61,065. Total outgoing letters, 168,275; total incoming letters, 134,393; parcel post, outgoing, 5,224.

An American consular report dated March 31, 1922, stated that during the first year of British air lines from the London airdrome (Croydon) under government subsidy, 2,000 British machines car-

ried 11,000 passengers between London and Paris. The total number of machines passing between the continent and London during the first year was 3,444; the total number of persons transported, 16,422, of whom 4,472 were crews.

As of the months, April, May and June, 1922, an Air Ministry Report said: Seven hundred and sixty-four machines departed from Croydon and 768 machines arrived, a considerable increase for the same period in 1921. The majority of the machines belonged to Instone, Handley Page and Daimler. Figures by nationality were: 915 British, 228 French, 189 Dutch. The total number of passengers carried was 3,128, a slight decrease. The proportion carried by the British machines, however, greatly increased, the number being 2,402 as against 1,653. The British traffic amounted, therefore, to 76.8 per cent as against 46.4 per cent which is argued as justification for the subsidy.

An example of the interest which the railroads are taking in aviation is the support which the London and Southwestern Railway Company is said to be giving the British Marine Air Navigation Co., Ltd., organized late in 1922 to operate between Southampton and the French ports of Havre and Cherbourg. The plan is to transport passengers landing in France to Southampton, where fast trains will carry them through Great Britain. The company, if "approved," will receive a subsidy of 25 per cent of the gross earnings and also a payment of 1 pound, 10 shillings per passenger carried and 1 shilling, 5 pence per pound of goods.

The subsidy situation in Great Britain has not yet been definitely settled, however. There is criticism by the smaller operators of the "approved" plan. Yet, late in 1922, a committee appointed by the Air Ministry reported in favor of an even more extensive subsidy plan, one which would mean the expenditure of $5,000,000 to one great British air combination. The assumption is that the three largest now in existence—Daimler, Handley Page and Instone—would get together.

The airship situation may be summed up in the following reply by the Prime Minister, given in the House of Commons on July 17th: "As a result of several meetings of the Committee of Imperial Defence it was decided that, in view of the need for economy, no money should be expended in developing an airship service, either for commercial purposes or with the object of establishing Imperial Communications."

Prior to this the so-called "Burney airship scheme" was advanced, but met with disfavor, because it required an annual subsidy of almost $500,000 a year. Subsequently, Messrs. Vickers and the Shell Oil

group put forward a proposal, but, it, too, required a subsidy. And there the matter, for the time being, rests.

GUATEMALA

The French have attempted commercial aviation; one plane is in operation. Guatemala has a National Academy of Aviation where, during 1922, 154 flights were made by the graduates.

HONDURAS

A public fund has been started to supply Honduras with aeronautical equipment and information.

HUNGARY

On April 29, 1922, operations were begun on the Budapest-Paris air line. The time between Prague and Vienna is 80 minutes and between Budapest and Vienna, 1½ hours. The airplanes in service carry three passengers, besides mail.

ITALY

In Italy military aeronautics comes under the Superior Command of Aeronautics; naval, under the Inspectorate of Aeronautics Bureau.

After some weeks of careful investigation, Premier Mussolini, as he promised before forming a new Government, created a Commissioner of Aeronautics. The Premier himself, so intense is his interest in aeronautics, will be the commissioner, but the effective head will be the assistant commissioner, the Hon. Aldo Finzi. The office of the Commissioner of Aeronautics is unique, in that it is independent from the Army and Navy, and yet will handle both military, naval and commercial aviation. An unsuccessful attempt had been made to stimulate aeronautics by placing it directly under the Assistant Secretary of War.

The Commissioner of Aeronautics has the same administrative and political importance as other departments and the chiefs will participate in the cabinet meetings. The assistant commissioner is a pilot. He participated in the raids over Vienna and his appointment is regarded as recognition on the part of the Government of the superior importance of aviation. Colonel Moizo, who was the representative of Italy at the Conference on the Limitation of Armament in Washington, will be Chief of the Military Bureau, and Commander Mercanti will head the General Commercial Bureau. Lieutenant Colonel A. Guidoni, for several years Air Attache at Washington, returns to Italy to head the Technical Section. It is through

the courtesy of Colonel Guidoni that most of the information on Italy for this volume has been obtained.

The General Bureau of Military Aeronautics will at once begin to study the creation of an Air Force and will organize, instruct and govern all tactical units which are operated by both Army and Navy.

The General Bureau of Commercial Aeronautics will have a division for the establishment of air routes, licensing of pilots, inspection of machines, etc., and a technical division for all research, experimental work and production and supply to all branches of the Army, Navy and Separate Air Service.

In forming the new office of Commissioner of Aeronautics, the Premier had the assistance of General G. Douhet, internationally known for his work, "The Conquest of the Air."

Military aviation equipment consists of approximately 25 flights, (150 airplanes), in service and 500 airplanes (in reserve), 10 balloons and 5 airships. The personnel consists of 480 officers and 5,850 men. Three hundred of the officers are pilots. There are 20 flying fields and 10 service field depots. Following is the form of military organization: one headquarter, heavier than air, with three groups; balloons, airships and gas service; one headquarter, lighter-than-air, with two groups, balloons, airships and gas service. In heavier-than-air, all experimental and production work is done by private firms. In lighter-than-air, the Stabilimento per Construzioni Aeronautiche has charge of the experimental work of balloons and airships.

In 1922, 30,000,000 lire ($6,000,000) was appropriated for military aviation, of which $1,500,000 was for new construction. For the year 1923, under the new Commissioner of Aeronautics, it is reported 270,000,000 lire ($54,000,000) will be provided, and sufficient of this fund set aside to construct 720 new machines.

During 1922 550,000 miles were flown. There were twenty-five fatalities.

Naval aviation embraces 45 seaplanes (in service) and 80 in reserve, 1 airship and 5 balloons. Personnel numbers 70 officers and 800 men. Of the officers 45 are pilots. There are 5 seaplane stations and 3 service stations. All the experimental and construction work is carried out by the Technical Section or by private firms.

During 1922, 15,000,000 lire ($3,000,000) was appropriated for naval aviation, of which $200,000 was apportioned for new construction.

In naval aviation, in 1922, 100,000 miles were flown. There were eleven accidents.

Italy is a mountainous country and not of great territorial extent.

Rome, the capital, is in the center of the peninsula. Night trains, leaving Rome at 8 p. m., reach the northern or southern borders the following morning. It was necessary, therefore, to establish an air transportation service which would compete with the railway. A definite programme of Italian air routes has been laid out along the lines employed during the war. These lines follow the valleys and coasts. They cross the Apennines only at two points. The net of air routes will be about 2,400 miles long.

About 75,000,000 lire ($15,000,000) is invested in the Italian aircraft industry, which gives employment to 3,000 engineers and workmen. There are six air transportation companies with 4,000,000 lire ($800,000) capital. These lines give employment to 800 persons.

The establishment of the office of Commissioner of Aeronautics is of great significance and is likely to have considerable influence on the policy of other countries with regard to the necessity for a Separate Air Force. On June 30, 1922, it was reported that a Committee of the Camera or House of Representatives had submitted a questionnaire to the Aero-Technical Association of Italy requesting expressions of opinion on the establishment of an Air Ministry, or other centralized body, for the intensified development of all aviation. The recommendations were that the only possible foundation on which aeronautics could develop was through the unification of all aeronautical activities. It was further declared that advance, depended, first, upon the preparation and organization of aerial routes; second, the preparation and organization of airports with proper aerological telegraphic and radio service; third, the promulgation of the necessary air regulations and legislation; four, subsidization of aerial enterprises in their initial stages.

India (British Empire)

The Indian division of the Royal Air Force, on September 18, 1922, consisted of 229 officers, 1,706 men and 815 civilians. Great dissatisfaction has been expressed over the state of the equipment. Aircraft are used extensively for policing purposes. The air base for all India is at Karachi. Sixty-three squadrons are stationed throughout India, some as far as 2,000 miles distant from Karachi. Many of the planes are powered with American Liberty motors which function admirably in the difficult and changeable climates.

Preparations have been made for an air mail route between Bombay, Calcutta and Rangoon. The Indian Government policy has tended toward the establishment of training schools for natives.

A new aviation company has been formed with a capital of 10 lakhs of rupees for the transport of passengers and possibly mail

throughout India, Burmah and Kashmir. The civil airdromes at Allahabad and Dum Dum are ready for use.

The control of civil aviation is now under the Department of Public Works. The following licenses have been issued: 13 aircraft registered; 5 private pilots' licenses; 5 commercial pilots' licenses; 10 ground engineers' certificates.

JAPAN

The following quoted information has been obtained by the United States Military Attache at Tokio through the courtesy of the Japanese War and Navy Departments:

"Military and naval aviation continue under the War and Navy Departments, respectively. The aviation directorate of the War Department selects each year a number of civilians to be trained at the Tokorozawa Flight School for Civilian Aviators. Hitherto the number has been ten per year, but for the present year fifteen are being trained. With this exception there is no governmental civilian aviation. The Imperial Aviation Association encourages civilian aviation, it in turn being assisted by the Board of Air of the War Department.

"There are eight army airdromes. Military aviation is divided into six air battalions, one balloon corps and three aviation schools. The air battalions in numerical order are commanded by the following: Col. T. Ozawa, Infantry; Col. K. Hosoki, Infantry; Lieut.-Col. M. Goto, Artillery; Lieut.-Col. S. Kurashige, Infantry; Lieut.-Col. Y. Sakurai, Artillery; Lieut.-Col. W. Masuda, Engineers; Major K. Takahashi, Engineers. In 1922 the total distance flown by the army air service was 668,722 miles.

"Personnel of naval aviation embraces 181 officers, 55 warrant officers and 1,951 petty officers and men. Equipment consists of 128 planes of various types; 6 balloons (moored) and 1 'mother ship.' Of the personnel, 199 are pilots. There are two seaplane stations, two service fields and three depots. Naval aviation is under the Minister of Marine. This ministry is divided as follows: Bureau of Military Affairs (general administration concerning air service); Bureau of Stores (matter relating to fuels); Naval Technical Department (machines, material and arms); Naval Education Department (relating to education); Naval Stations (aviation corps, construction, navy yards and repairs); Fleets (mother ships, deck airplanes).

"Following are the principal naval aviation officers: Commanding Kasumigaura Aviation Corps, Rear Admiral T. Tajiri; commanding Yokosuka Aviation Corps, Capt. S. Furukawa; commanding Sasebo Aviation Corps, Capt. Y. Kaneko; commanding depot ship Wakamiya, Commander S. Fukuoka.

"The naval flying machine experimental station is closely connected with the experimental laboratory belonging to the Department of Education. The navy is carrying on various investigations and experiments.

"In 1922 naval aviation appropriations amounted to Yen 22,677,780 ($11,304,873.33), of which Yen 3,175,376 ($1,586,924.93) was for new construction.

"From April, 1921, to March, 1922, 3,220 hours were flown by naval planes.

"The *'Hosho'* aircraft carrier is expected to be completed shortly. In accordance with the Washington conference, Japan is proceeding with plans

for the reconstruction of two battle cruisers, *'Amagi'* and *'Akagi'* into airplane depot ships.

"Commercial aviation consists of various civilian aviation activities under the auspices of the Imperial Aviation Association. Yen 14,843,000 ($7,399,235) is invested in civilian aviation enterprises. Civilian aviation enterprises employ 2,389 persons. A subsidy of Yen 30,000 ($14,955) per year is granted to the Imperial Aviation Association by the War Department on the following conditions: To supplement the cost of repairs to airplanes owned by the Japanese. To relieve the aviator or his surviving family when the Japanese civilian aviator is killed or injured on account of an aerial accident.

"Interest in flying is gradually increasing in Japan, but not much progress has been made outside of the Army and Navy."

The progress which Japan is making in emulation of the Western nations has commanded much attention in the European and North American daily and periodical press. In particular, interest has been expressed in the Japanese efforts toward the development of flying.

To those nations pursuing a definite aviation policy, the Japanese Empire offered, during 1922, an attractive field for friendly exploitation. The influence, particularly of the British, and, to a lesser degree, of the French, German and Italians, was very apparent. The situation, so far as American aviation interests were concerned, was unsatisfactory, and, in some ways, unfortunate, due largely to the fact that trouble makers, commercial and political, were apt to dilate upon any real or fancied controversy, the elements of which had already attracted attention in the Japanese and American press.

A conscientious analysis would seem to indicate the following: The western nations recognize in Asia the world's greatest remaining unexploited market for goods of all kinds. Most of the European nations discern that Japan, as the dominant power in Asia today, appears to hold the key to the future. The obvious conclusion would be for the commercial salesmen to work through Japanese channels. Thus the presence in Japan during the year of groups of aviation experts from Great Britain and France and individuals, with probably less official standing, from Germany and Italy.

The official utterances of responsible Japanese leaders may be accepted as explaining Japan's position on aviation. Japan is ambitious for recognition among the great nations. The attitude followed during the Conference on the Limitation of Armament, in Washington, and actions subsequent thereto, indicated a desire to live up to international agreements. Aviation is not proscribed and Japan sees in it the same economic and defensive factors visualized by other great powers.

Up to September, 1922, civil aviation was under the War Department; now it is directed by the Communications Department, with

the closest co-operation by the military and naval services, the army, for instance, training aviators for police duty in Formosa, and also organizing a regular air service between Tokio and Kouchow by way of Kagamigahara and Okayama. The Civil Aviation Bureau of the Communications Department has an ambitious program, calling for the expenditure in the next seven years of $25,000,000. Five air routes have been proposed, linking Japan to Korea, Alaska, the Siberian littoral, and the North American Continent, by direct route straight across the Pacific Ocean. The plans contemplate the establishment in Japan of forty-two air stations of the first and second class, with emergency fields every thirty miles.

These elaborate plans apparently have the support of the public. The Imperial Aeronautic Association at Tokio is very active. It is reported to have recently received from the Government a grant of 500,000 Yen (about $250,000). There are three aviation clubs in Japan, with a combined membership of 14,000. November 2, 1922, first flights were made over Japan's initial air mail route, between Tokio and Osaka, a distance of 450 miles.

Special efforts are being made to stimulate private operating and manufacturing. Upon request by the Civil Aviation Bureau, the Army distributed gratis sixty obsolescent types of training planes to civilians desirous of flying but unable to purchase equipment. The number of commercial planes in operation is unknown, but it is reported that there are ten fields maintained by private owners.

It is understood that airplane factories are being erected at three points near the various aviation concentration camps of the army. The shipbuilding interests are reported to be going in heavily for aviation—another indicated effect of the Washington Conference. The Mitsubishi Motor Co., at Nagoya, is about to turn out in quantity production a new type of plane. This plane is said to have been developed under the guidance of a British engineer, though it is powered with a French engine. Work has been started by the Aichi Tokei Denki Kabushiki Kaishi (Aichi Clock and Electric Machinery Co.) on the construction of an airplane factory with a capacity of fifty planes a month. The Kawasaki Works of Kobe expect to erect airplane factories in the Gifu Prefecture. Photographs were recently received in the United States illustrating four new types of Japanese produced airplanes. Examination indicates inspiration or guidance from the English, French or German.

The mischief makers, already referred to, direct their attentions to both the British and Americans. An editorial in the *Aeroplane* (London), November 29th, commented on the efforts to belittle the

English influence under the mission headed by the Colonel the Master of Sempill.

In the *Far Eastern Motors,* July, there appeared an article of special interest to the United States. To quote:

"The Japanese-American war scare was responsible for great activity in aviation in Japan, providing manufacturers of other countries an exceptional opportunity of getting their machines in this market."

The same paper states that more than 200 planes have been purchased from the British and that one British company received $150,000 for the Japanese rights to manufacture one type. The paper adds:

"From the accounts printed in the British and French technical press at that time, there is little doubt that full advantage was taken of a situation that practically closed the Japanese market for American aircraft manufacturers. With the Chinese market closed to others by reason of the Vickers loan (see China, this chapter), American manufacturers were quietly but effectively edged out of the Far East."

From other sources, it is reported that in 1922 the Japanese purchased 600 planes from the French.

Jugo-Slavia

The Government has 95 planes in the military and naval establishment.

Latvia

The Russian Soviet Government has applied to Latvia for co-operation in establishing landing fields in Latvia for the Russo-German enterprise, the Berlin-Moscow air service.

Lithuania

Aviation training and organization are directed by the Swedish. German pilots were at first utilized, but under pressure from the Allies these were dismissed and British were substituted. The British later resigned. In its air service, Lithuania has 24 planes.

Malta (British Empire)

The British maintain an air station with about thirty planes in service.

Mesopotamia (British Empire)

At the close of September, 1922, the Royal Air Force assumed complete responsibility for the policing and defense of the British territory in Mesopotamia and nearby regions. All other military

forces were placed under the supreme command of Air Vice Marshal Sir John Salmond. Fourteen thousand men were placed at his disposal and heavy additions made to the air equipment. One hundred planes are in service, with 100 in reserve.

This is regarded as one of the most interesting developments in modern warfare. It is the first time that the aerial arm has been treated as a distinct factor, and, in addition, other arms have been placed subservient to it. Headquarters will be at Bagdad. Additions to the planes in service are troop-carrying aircraft which will be used, either for bombing or transport work.

The institution of the new policy has been due largely to Colonial Secretary Churchill, a staunch believer in the economy and utility of aircraft. It is stated that, by this change, the cost of maintaining order in Mesopotamia (and protecting the British oil interests in the East) will be reduced to one-fifth the sum necessary under ordinary military conditions.

Along with their regular military duties, the British maintain a regular air mail service between Cairo and Bagdad, every other Saturday. Regular postage rates, plus eight annas per ounce or fraction thereof, apply. Patronage is heavy.

A fortnightly mail service is also maintained between Mesopotamia and Palestine, open to civilian as well as military mail. The usual foreign postal rate for the class of matter dispatched must be prepaid and in addition a special fee of 2.5 piasters (a piaster is about 4 cents) is required for each 20 grammes or fraction thereof for all classes of mail.

Mexico

Although the Government has lacked the funds desirable, notable steps have been taken for the development of the Mexican air service. At present 52 airplanes are owned by the Government. Three million pesos ($1,495,500) have been appropriated for the establishment of a military air port. Colonel Silvero Hoyer, of the Department of Aviation, represented his Government at the Pulitzer races in Detroit, Michigan, in October, 1922, and also at the National Air Institute and the Second Aero Congress held in the same city.

The disposition of the Mexican air officials is to co-operate with American aviation interests, but handicaps are arbitrarily imposed by reason of the fact that the United States has not yet recognized the existing Government of Mexico. Although a certain number of planes have been purchased in the United States, it is reported that the Government is contemplating buying 200 from Europe.

The Government of the States of Sonora, Sinaloa and Nayarit

recently bought six airplanes for patrol duty along the West Coast from Mazatlan to Lapaz.

A technical section has been opened in the Department of Public Works in Mexico City to care especially for aeronautical problems.

According to the Diario Official of February 23, 1922, a permit was issued to C. V. Pickup, an American, to establish an airplane passenger and mail service between the states of Vera Cruz and Tamaulipas and the City of Mexico. He was authorized to charge not over $1 per kilometer per passenger and each passenger was to be permitted 10 milligrammes of baggage free. The concessionnaire was to be required to put up a bond of $3,000. It is not known whether the service was begun.

Nassau, Bahamas (British Empire)

The establishment of an Aeromarine Airport (Aeromarine Airways, Inc., New York City) created a great deal of interest in the British Colony. At the beginning of the 1922 season, one of the Aeromarine eleven passenger enclosed flying boats was named after the Governor of the Bahamas, Major Sir Harry Edward Spiller Cordeaux, K. C. M. G., C. B., who formally gave his name to the craft at a christening ceremony which was attended by all the British officials and many notable Americans then visiting in Nassau.

The Aeromarine Airways makes the flight from Miami, Fla., to Nassau in 2½ hours, as against 20 hours by steamer, thus making it possible for visitors in Miami to fly to Nassau for lunch and return to Miami for dinner.

Flights were made daily between Miami and Nassau during the southern season and this new route was successful from every standpoint.

Netherlands

The Dutch Government pursued in 1922 its general policy sympathetic to aviation at home and in the colonies. Aviation appropriations for the year came to a total of 3,113,716 florins ($1,252,713), including 800,000 florins ($321,600) for new construction. Subsidies appropriation for the year amounted to 325,000 florins ($150,000).

It was stated in May, 1922, that the Netherlands was unable to adhere to the Convention for the Regulation of International Air Navigation because (1) Art. 5 does not permit the Netherlands to freely determine for itself which aircraft could be permitted to operate above its territory, and (2) because Art. 34 so reads that in any case the voting is so arranged that the United States, France,

Great Britain, Italy and Japan together will command a majority of the votes.

Holland's prominence in international aviation is due principally to the untiring efforts of the Netherlands Royal Air Service. The report of this company for the flying period, April 18-October 9, 1922, gives the following details:

Route	*Passengers*	*Letters*	*Parcel Post*	*Freight Packages*
Amsterdam-London	206	334,268	397,125	14,819
London-Amsterdam	159	238,824	1,275,430	30,951
Amsterdam-Paris	144	114,635	.....	3,225
Paris-Amsterdam	193	117,524	.....	13,894
Amsterdam to and from Rotterdam	293	.....	.....	.....
	995	803,251	1,672,556	62,889

The quantity of merchandise transported in 1922 was double that during the corresponding period of 1921. Many newspapers are carried on the London-Amsterdam route, thereby affording delivery the same day of publication. During the season ending October 9, 1922, 752 flights were made over the regular routes without an accident. Since it was established, this company's airplanes have flown 1,200,000 kilometers (745,564 miles) without accident. This is attributed in large degree to the fact that each ship is thoroughly inspected and before a return flight is made overhauled, if necessary. With the conclusion of the summer service October 9 a winter service began.

The Netherlands Government allows this company a yearly subsidy of 400,000 florins ($160,000). In addition the Government provides terminal facilities at Amsterdam. The charge for passengers between Amsterdam and London was reduced in 1922 from 75 florins to 48 florins ($30 to $19). In consequence it is stated that there was a marked increase in bookings.

During the German railway strike February, 1922, this company carried on an Amsterdam-Rotterdam-Bremen service.

The principal unit in the Dutch aircraft industry is the Fokker company, which is developing business in Russia. Out of eighteen machines exported in 1922 ten went to Russia, two to the Dutch East Indies and four to Germany. The other two are reported to have gone to the United States.

The International Air Traffic Association met at The Hague, March, 1922. At this convention the following air lines were

approved and the operators of all agreed that the central office should issue regulations binding upon each:

London-Amsterdam-Bremen-Hamburg-Copenhagen.
London-Amsterdam-Bremen-Hamburg-Berlin.
London-Brussels-Dortmund-Berlin.
London-Paris-Lyons-Geneva.
London-Paris-Lyons-Marseilles.
Amsterdam-Brussels-Geneva.
Paris-Strassbourg-Prague-Warsaw-Vienna-Budapest-Bucharest-Constantinople.
Koenigsberg-Moscow.

The association planned to co-operate, in the development of traffic, with the International Postal Union and the League of Nations.

Agreements were entered into by the following operating lines: Compagnie Franco-Rumaine, Svenska Luft Trafik Aktiebslaget, Det Danska Luftfart Selskab, Compagnie Messageries Aeriennes, Koninglyke Nederlandsche Luchtvaart Maatsshappij, Société Nationale pour l'Etude des Transports Aeriens, Danziger Luft Reederei and Deutsche Luft Reederei.

New Zealand (British Empire)

Efforts are made to raise by popular subscription a $100,000 fund to aid the New Zealand Aero Transport Co. Arrangements are being made with the Auckland Service Aero Club for a terminal at Auckland.

An Air Navigation Bill, necessary to bring into effect the International Air Convention, is being prepared for presentation to Parliament, and provisional regulations thereunder, providing for a system of licensing and inspecting aircraft and personnel, are being drafted.

Norway

Norway has 1,183 aviators, of whom 119 are pilots of land machines. Twenty-one commercial aircraft are in operation. Three airplanes built by the Norwegian factory at Toensberg were delivered to the Bergen forts in July.

Paraguay

There is only military aviation in Paraguay, and it is under the Ministry of War. The air service has but three airplanes; these are of Italian make. The military aviation school is under the

direction of Captain Ramon Ortiz Canriza. It is reported that the Government recently purchased additional equipment from France and Italy, and that Germany presented Paraguay with two craft.

Peru

Peru is ambitious to progress in the air. On the occasion of a visit to New York early in 1923, Captain Walter Simon, Assistant Director of Aeronautics, declared it to be his opinion that Peru outflew the United States in 1922, comparatively speaking. Commercial aeronautics he regards as paramount to military. Peru hopes to bring about the establishment of air communications between Lima and Panama, which will mean the saving of much time and bring his country nearer northern business markets.

The Peruvian Navy has twenty seaplanes and maintains an aviation school. A new military aviation field was established at Las Palmas in 1922. The military equipment consist mainly of Curtiss machines. The Italian Pilot Rolandi was awarded 1,000 pounds (Peruvian) for a notable flight between Lima and Cusco.

What was regarded as a remarkable demonstration was the crossing of the Andes by an American aviator, Elmer J. Faucett, who flew a Curtiss *"Oriole"* from Lima to the Amazon port of Iquitos. The air distance was 900 miles. In negotiating the peaks he forced his machine to an altitude of 17,000 feet.

Poland

The Polish air service has 4,000 officers and men and is equipped with 250 planes, mainly French, with French equipment, and a small number of Italian. General Maceiviez is chief of the aviation department. Poland has shown a desire to be independent in aircraft production and is fostering the rudiments of an industry at Lublin. The principal French manufacturers are reported to be financially backing another aircraft plant in Poland. The Polish Government joins with the French in subsidizing the French-owned Paris-Warsaw air service. Poland's subsidy is in the form of free terminal facilities and fuel. In 1922 Poland also subsidized a new Polish line between Danzig, Warsaw and Bucharest. To these operators a mail monopoly was given.

Porto Rico (United States of America)

The first regularly operated passenger air line out of San Juan, Porto Rico, was officially opened in January by Aeromarine Airways, Inc., New York City. Pilot C. J. Zimmermann with the *"Morro Castle,"* an Aeromarine-Navy HS-2-L 6-seater open cockpit flying

boat, arrived in San Juan and a few days later the boat was placed in commission and since that time there has been a heavy demand among Porto Ricans for flights over San Juan and to St. Thomas and the neighboring islands.

The opening of the San Juan airport also signifies the establishment of a new unit of Aeromarine Airways, to be known as the Porto Rico Division—which is the fourth in the Aeromarine system.

Portugal

The Army has 48 planes; the Navy 22. Lieutenant Colonel Antonio Maria de Frietas Soares is director of aviation. Two Portuguese aviators, after many delays and two wrecks, flew from Lisbon to Brazil. They were: Commander Socadera Cabral and Captain Gogo Continlio. They started March 30. Their itinerary included Las Palmas, Cape Verde, Fernando de Noronba, St. Roque and Rio de Janeiro. They reached Rio on June 17th.

Rumania

The Rumanian air service has 240 officers and 5,000 men. Lieutenant Colonel A. Papovici is director of aviation. In 1921 35,000,000 leis ($6,255,000) were appropriated for military aviation, of which 16,000,000 leis ($3,148,000) were for new construction. The Government is encouraging civil aviation. Both France and England are endeavoring to supply Rumania with aerial equipment, each participating in providing a portion of the 165 planes now used. Lately there has been a popular demand for the development of the aircraft industry in Rumania and as a result a national airplane factory has been established.

Writing in the French publication, *L'air,* Professor Ing. Mirea succinctly stated the Rumanian ambitions. "When commercial air navigation made its debut in Europe," he declared, "Rumania, knowing that commerce and industry make rapid strides in our times, understood the necessity of creating its own civil aviation. Appreciating its geographical and technical position, Rumania's ambition has been to attain a high position in air navigation at any reasonable sacrifice. Rumania considers it an international obligation to participate in the solution of the problem of 'The Progress of the World by Aerial Navigation,' especially as she will be the center of the lines joining Paris and Asia, Danzig and Egypt and Rome-Peking. The ice has been broken, and from the organization laid down Rumania does not risk ever receiving the reply of neighbor *Jupiter* saying, 'What can be done? I have given the sky to others!"

Russia (Soviet)

The Soviet Government is reported to be working in close co-operation with the German Government in the development of both military and civil aviation in the Republic. (See Germany, this chapter). The authorities are declared, in various reports, to be purchasing French and Dutch planes, in addition to German. Special aviation schools have been established at Toula, Moscow, Smolensk, Kharkow, Pola and Ekaterineslaw, Mokilaw and Petrograd.

The Council of Commissaries of the People have voted appropriations to obtain 300 airplanes for the Red Army. It is declared that 100 have also been procured from Italy. Airplane factories have been established by the Soviet Government at Petrograd, Nizni-Novgorod, Toula and Ekanterineslaw.

The attitude of the Soviets toward aviation is sympathetic. It is recognized as a valuable adjunct to the considerable military establishment maintained. A significant indication of policy being followed to neighboring states is the report that Russia is supplying airplanes to the Government of Afghanistan.

The official publication of the air service of Soviet Russia is called the *Air Fleet Messenger*. In spirit the magazine is warlike. From this magazine it appears that an ambitious program is in view, including the creating of technical and flying schools, schools for airplane mechanics, experimental fields, army air stations, aerial ordnance, etc. The chief Russian air centers, according to this paper, are at Moscow, Smolensk, Podosinsk, Petrograd, Rostoff, and Sebastopol, at which are stationed thirty-nine squadrons. In addition, there are thirty-one squadrons in the Ukraine and in Asiatic Russia, especially at Pambos, Kief, Kazan, Samara, Orlof, Omsk and Tashkend. General Lazarew, of the late Russian Imperial Army, has been appointed Chief of the Soviet Air Force.

The terms under which a combination of Russian and German capital undertake to provide air service between the chief cities of the respective countries render significant an article in the *London Daily Mail*, which quotes the text of an alleged German-Russian secret treaty. This paper says: "In addition to those already supplied, the German General Staff undertakes to deliver as soon as possible, 500 or more new airplanes of the Junkers type, with a corresponding number of spare parts."

The aviation correspondent of the *London Daily Telegraph* writes:

"Ostensibly Russian, but designed, built and operated by German designers, constructors and pilots, a great fleet of 5,000 airplanes is now to be equipped and flown within Russian territory. With the assistance of German aero-

nautical experts, the Soviet Government has just completed a survey of the aerial possibilities of Russia, and a new exploitation of these vast territories, initiated and maintained by air, is what is aimed at now. Great trunk air lines have been mapped out by the German experts, and a technical expert, in the official air organ of the Soviet authorities, now declares that the Russian airway potentialities are becoming so vast that, by 1926, the great air factories which are now being established here and there in Russian territory, will be called upon to turn out several thousands of new commercial airplanes each year in order to cope with the ever-increasing demand for 'flying stock.' This 'air restoration' of Russia, providing a swift, constant communication, will, their German advisers have told the Soviet Government, effect bigger practical results in a few months than could be achieved by other means in years. From the astute German point of view, the scheme will provide a unique method for German engineers not only to gain just the experience which is now required in widespread airway co-operation, but also in detailed 'air express' construction and in actual day and night pilotage on long routes—because, though the scheme embraces the training of 'air drivers' of Russian nationality, it is taken for granted that in the early stages, and for some time afterwards, the bulk of the expert flyers will be German ex-war pilots."

SIAM

A committee of Siamese air experts, educated in France, has been appointed to expend $103,400 on the purchase of air mail equipment. Reports stated that, because of the purchasing agents having been trained in France, the purchases would undoubtedly be made in that country.

The Siamese Government is desirous of sending a delegation of young men to the United States to receive training in aerial navigation.

SOUTH AFRICA (British Empire)

Aviation in the Union of South Africa is under a Director of the Air Service, functioning under the Colonial Government. The strength of the air service is 35 officers and 300 men. From the mother country (Great Britain) were obtained 100 airplanes as a gift, together with large quantities of supplies. Altogether 112 planes constitute the service equipment.

SPAIN

The Spanish military air equipment constitutes 220 planes, and the naval, 40 to 50; most of British, French and Italian manufacture. Air centers have been established at Madrid and Seville. The Navy has one airplane mother ship, the *"Dedalo,"* of 5,623 tons.

Army aviation appropriations in 1922 amounted to 36,000,000 pesetas ($5,520,000); naval aviation, 11,044,631 pesetas ($1,701,000) or a total of $7,221,000. In addition, subsidies were granted amounting to 1,525,000 pesetas ($235,000). General Echague is director of Military Aeronautics.

The Moroccan campaign forced the attention of Spain seriously upon the air. Since reverses in tribal warfare, efforts have been made to provide the punitive troops with planes which have proved so effective in similar work in Africa. The Spanish Government late in 1922 invited the designers of the world to compete for pursuit, reconnaissance and bombing plane prizes, the condition being that all equipment, except the sample, must be manufactured in Spain. The Hispano Automobile Co. recently erected a special plant at Guadalajara for the manufacture of airplanes and at the close of 1922 had turned out 60 aircraft.

The Government offers civil subsidies. An English-owned operated company runs an airline between Seville, Larache and North African points. Subsidy takes the form of airdromes, hangars, etc., and money payments of 60 pesetas per aerial kilometer.

A daily air mail service between Barcelona and the Balearic Islands was opened March 20th. Five seaplanes are employed. The Balearic terminal is Palma de Mallorca.

A concession has also been granted to a company in San Sebastian to establish a double air line between Madrid and San Sebastian.

In the Aircraft Year Book for 1922 detailed plans were given of the proposed Hispano-Zeppelin airship service between Seville and Buenos Aires. In the year that has passed, much progress has been made. The President-elect of the Argentine Republic visited Spain in August, chiefly to discuss the airship plans with the king of Spain. Both His Majesty and the President are enthusiastic. Commandante Herrera, a Spanish engineer, is in charge of the development work. He spent a considerable part of 1922 in Germany, in consultation with the Zeppelins.

Sites for hangars and fields at Seville have been selected. It is stated that each of the huge sheds will cost $500,000. Three are to be constructed. They will be revolving and will be sufficient in size to house ships 300 meters (989 feet) in length and of 200,000 cubic meters (7,062,800 cubic feet) gas capacity. Two of the ships will be of the above size; one will be slightly smaller, as it will be used only between Spain and the Canary Islands for the instruction of Spanish crews. The big Zeppelin passenger-carrying airships will be powered with nine Maybach engines of 400 h.p. each. The cabin will be placed forward. In it there will be quarters for the pilot and his staff, a salon, a kitchen and smoking room. Space for baggage will be provided along the keel. Forty passengers can be taken, but it is intended to devote the bulk of the space to cargo mail. One journey a week will be made each way. The fare, it is esti-

mated, will be about $1,000 one way. The postal rate will be 75 cents a letter.

It is now definitely known that the Spanish Government will officially back the airship line. The project requires 100,000,000 pesetas ($15,500,000). A law has been passed authorizing the Government to negotiate the details of an arrangement with the airship company. A Royal Decree was expected early in 1923 bringing to the airship company the necessary financial guarantee, and also to arrange for the letting of certain construction contracts in Seville.

SWEDEN

Sweden leads in the air in the Scandinavian peninsula, having 188 aviators and thirteen civil machines.

The Government has made an intensive study of the subject and has made recommendations for the building up of air traffic. It is proposed to concentrate efforts first on the Stockholm Gothenburg and Stockholm-Malmo and Gothenburg-Malmo routes. Gothenburg, as the chief seaport in Sweden, is the natural point of origin for air lines operating to Russia, Germany and England. Impetus was given preparations for these projects by the international exposition which is to be held in Gothenburg in 1923.

The Government has agreed to give a subsidy of 500 kronen for every air mail flight between Copenhagen and Warnemunde. By an agreement, effective January 1, 1923, air traffic between Sweden and Denmark was to be established by way of the following routes: land plane service through Stockholm, Ostersund, Karlstad, Gothenburg and Malmo in Sweden and Christianshaven in Denmark; seaplane service through Stockholm, Ostersund, Karlstad, Stromstad, Gothenburg, Helsingborg and Malmo in Sweden, and Marinens Flygdepot at Copenhagen in Denmark. A similar agreement between Sweden and Norway is contemplated.

SWITZERLAND

In 1922 the Federal Air Board appropriated 117,000 francs for courses in instruction and the purchase of flying equipment. Of this amount, 5,000 francs are for customs station pylons, 30,000 francs for subsidies to aid in the purchase of new machines, 30,000 francs for air mail subsidies, 400 francs per month per pilot to any aviation enterprise employing military pilots in a flying capacity.

Major Isler is Director of the Federal Air Board.

It is a policy of the Government that exploitation within Switzerland can be carried on only by Swiss companies. There are four such—Ecole Aero; Ad-Astra Aero Tourieme; Comete and Michel

and Kunkler. Landing fields are divided into four classes—custom house airdromes, public airdromes, open to internal traffic, military fields for restricted public use and private fields. Commercial aviation embraces about 50 planes.

There was severe protest among the Swiss when the city of Lausanne voted a subsidy of 35,000 Swiss francs ($7,000) to a French company operating between Lausanne and Paris.

Syria (France)

The French have established a system of aerial couriers radiating from a central airdrome at Aleppo and Latakia to connect the littoral with the interior across the mountains. This means rapid mail service to a hitherto isolated region.

Turkey

The Angora Government has appropriated 150,000 pounds (Turkish gold) for the purchase of aviation equipment. It is reported that, prior to the crisis in Asia Minor late in 1922, both the British and French were endeavoring to sell planes to the Turks and that in this manner Kemal obtained his initial equipment. When it came to operating, it is reported that he had the assistance of German pilots. The Turk Nationalist Army based a large part of its warlike appeal to the public sense of the air, the patriotic posters prominently displaying a bombing airplane as surmounting both cavalry and infantry. In the operations against the Greeks the Turks employed airplanes for bombing purposes. They are reported now to have 35 machines, with 12 more ordered from France.

Uruguay

The Government has 25 planes. Representatives of the Government were sent abroad to purchase equipment. A Uruguayan society has taken a popular subscription to purchase a Curtiss seaplane.

On December 18, 1921, a Montevideo-Buenos Aires air line was established. At last accounts it had made 84 trips, carrying 281 passengers. The plan is to utilize aviation to link the republic more closely with its neighbors.

During the fiscal year 1921-22, twelve students were graduated from the military aviation schools.

Venezuela

The air service has ten planes. Instruction has been under the guidance of a French mission and arrangements are being made for the purchase of new equipment from France.

CHAPTER X

TECHNICAL PROGRESS IN AIRCRAFT CONSTRUCTION DURING 1922

THE year 1922 is a landmark in aeronautical progress, especially in the structural development of aircraft in the United States. Real progress is marked by the increase in reliability, structural strength, and performance. Advance has included all activities, from the purely technical to the constructional features that go to make for better aircraft. Strange as it may seem, the lack of commercial aviation in the United States has apparently had no effect on the progress in technical development, measured by the progress made in foreign countries during the same period.

The outstanding factor is the greatly increased reliability and performance of our aircraft engines. The engine is the heart of the aircraft, and an advance that indicates an increase of reliability of from four to six times that expected during the previous year may be considered tremendous. This is largely due to the adoption by the Bureau of Aeronautics of the Navy Department of specifications covering a 300-hour endurance test for all types of aircraft engines. Formerly a fifty-hour endurance test was satisfactory. It is with pride that we record that four different makes of American engines are now under test and some have passed the 250-hour period.

Another advance that has been rather marked is the success that has been attained in the construction of metal aircraft. The Bureau of Aeronautics of the Navy and the Engineering Division of the Army Air Service have been particularly active, co-operating with the various manufacturers, in the development of metal aircraft. Considering the lack of experience which the manufacturers have had prior to this year, this success is startling and indicates that it will not be long before the United States will lead in metal construction as it now leads in airplane performance, which fact was strikingly demonstrated by the results of the Pulitzer Race. The details of the accomplishments in both engine construction and metal construction will be considered later.

The development of aircraft accessories, seemingly unimportant, cannot be overestimated as not only the performance but also the reliability of an aircraft is largely dependent upon the proper design

and construction of accessories. For instance, the development of the new wing type radiator by the Curtiss Aeroplane and Motor Corporation has already had a far-reaching effect on the construction of pursuit type airplanes for our military services, and the performance of these airplanes far exceeds the performance of any foreign aircraft of a similar type. It has long been the hope of the aircraft designer to eliminate, if possible, the resistance of the present type radiator structure. In the past high-speed airplanes were constructed in which great care was taken, from an aerodynamic point of view, to obtain the maximum performance, but in every case the radiator structure would largely defeat the ambitions of the designer. The Curtiss wing type radiator has eliminated the resistance of the old core type, and the use of this radiator, together with the clean design of the Curtiss racer, made possible the world's high-speed record in the Pulitzer Race. The new wing surface radiator consists of two sheets of brass, one surface being flat and the other corrugated, the two sheets being soldered together and fastened to the surface of the wing. The water flows from edge to edge of the wing through the corrugations and between the two sheets. This type of radiator practically makes possible the elimination of the resistance of other radiator types. This radiator will undoubtedly be of value in other fields, as the flow of water to each section of the wing radiator can be controlled by the pilot, making it possible to cut out any section which may be desired on account of leakage. Since the Pulitzer Race of 1922, the Curtiss Company has produced a new model pursuit type airplane, which has been developed entirely from the Army Curtiss racer, and which has attained a speed of 171.7 miles per hour and is the fastest fighting airplane in the world.

Other engine accessories such as spark plugs, magnetos, generators, water and oil pumps, have been greatly improved through their use on aircraft engines in meeting the Navy 300-hour specifications.

Very distinct progress has also been made in the aerial photographic field.

Army Aircraft

An important development has also been sponsored by both the Army and the Navy in the design of high-speed thick-wing monoplanes. It has always been a question, from an aerodynamic point of view, whether it was not possible to obtain a higher speed with a monoplane than with a biplane, with its necessary strut and wire bracing. Recent results have shown a decided improvement in

monoplane construction, but as yet monoplanes have not attained the highest speeds made by biplanes. The Army Air Service does, however, hold one of the world's records with a Sperry monoplane constructed for the Pulitzer Race. In the construction of monoplane racers, new designs of retractable chassis were developed, which proved highly successful.

Although greatly hampered by the lack of legislation to regulate and promote air navigation, there has been substantial development in commercial aircraft in the United States during the past year. This development, with the exception of that carried on by the Aeromarine Plane and Motor Company and the Loening Aeronautical Engineering Corporation, has been largely concentrated on low-powered airplanes carrying from two to five passengers, among the most important being the airplane constructed by the Stout Metal Airplane Company, the Curtiss Company, G. Elias and Brother, and the Longren Company. The Aeromarine Plane and Motor Company constructed a single-engined commercial type airplane, designated as AMC model, having a passenger cabin with a seating capacity of five, in addition to a seat beside the pilot. The latest type passenger-carrying seaplane to be constructed is a limousine flying boat powered by two engines, and having a closed cabin for both passengers and pilot. Probably the most interesting feature of this model is the provision of a folding wheel landing gear, by which it may be converted from a flying boat into a land airplane when desired.

The most startling progress in military airplanes during the past year is to be found in the development of the new pursuit type airplanes, largely due to the stimulus provided by the Pulitzer Race. The new Curtiss single-seater pursuit airplane, equipped with a Curtiss D-12 engine, is undoubtedly the most advanced pursuit type airplane in the world, as regards speed, climb and maneuverability. The construction of this airplane, being practically all metal except for the veneer covering of the wings, makes it exceptionally well adapted for service purposes. The wing trussing is of the conventional biplane type, but the construction involves some new features, including multi-spar construction, which greatly diminishes vulnerability to gunfire. As a result of the Pulitzer Race, two pursuit type monoplanes were developed for the Army Air Service. One of these was the Loening thick-wing monoplane, equipped with a Packard 600-horsepower engine. The Thomas Morse Aircraft Corporation developed within three months a single-seater pursuit type monoplane, using all-metal construction. Steel tubing was used in the entire engine section, and duralumin in the rest of the fuselage,

wings, and control surfaces. No ribs were used in the wing construction, the corrugated duralumin being fastened directly to the multiple spars. A 600-horsepower Packard engine was installed in each of three racers which were constructed within three months, all three entering the Pulitzer Race.

In bombing types of airplanes, development has continued on the Glenn L. Martin bomber fitted with two 400-horsepower Liberty engines, the latest models being equipped with the Moss type supercharger, which was developed at the Engineering Division of the Army Air Service. One of the largest bombers ever built, the Barling bomber, designated as the NPL-1, has six Liberty engines, and was built by the Wittemann Aircraft Corporation. This airplane is now being assembled at Wilbur Wright Field. The L-W-F Engineering Company has redesigned the "Owl" equipped with three Liberty engines, provision being made for the carrying of 4,000 pounds of bombs. Experiments are now being conducted with this airplane at Aberdeen Proving Grounds.

Two new types of training airplanes have been constructed for the Army Air Service. One of these is the Dayton-Wright side-by-side training airplane, which was originally equipped with an 80-horsepower LeRhone engine, which has been replaced by a Wright 180-horsepower. One of the interesting features of this airplane is the muffling of the engine exhaust so as to make possible conversation between the instructor and the student. The major part of the structure, with the exception of the wings, is of steel tubing, and the fire hazard has been reduced by locating the gasoline tanks in the upper wing. The Huff-Daland Company has produced a very good training type of airplane, equipped with a 140-horsepower Lawrance air-cooled engine, the airplane being capable of making 118 miles per hour, with a landing speed of 45 miles per hour.

Naval Airplanes

The Navy, in its program of airplane development, has concentrated to a large extent on shipboard airplanes, small enough to be easily stowed away, and so designed as to be quickly assembled. One of the most interesting of the new types is the TS airplane, designed by the Bureau of Aeronautics. The TS-1, equipped with a Lawrance 220-horsepower air-cooled radial engine, has a speed of 125 miles per hour, and a gross weight of approximately 2,000 pounds. All wires and turnbuckles have been eliminated in the strut trussing of the wings, to make for ease of assembly and compactness. The Glenn L. Martin Company has designed and built for the Navy the Martin observation airplane, designated as the

MO-1, to be used for gun spotting. The airplane is of the monoplane type, built almost entirely of duralumin, provision being made for a pilot and two observers. The monoplane wing is placed above the fuselage, which provides very good visibility below the airplane. The airplane is equipped with a Curtiss D-12 engine, rated at 375 horsepower. The DT-2 torpedo airplane, constructed by the Douglas Company, has proved so far the most successful torpedo-carrying airplane. The design is of the twin-pontoon type, equipped with the Liberty engine, and with full torpedo load the airplane has climbed to 3,000 feet in ten minutes, and has shown a speed of 100 miles per hour. With the Wright D-2 engine, rated at 600 horsepower, installed, and with Lamblin radiators, the airplane has climbed, with military load, to 4,000 feet in ten minutes, and attained a speed of 110 miles per hour.

Airship Development

Airship development in the year 1922 was centered about the construction of the Navy's rigid airship ZR-1 and the first American semi-rigid airship which has been designed for the Army Air Service by the engineers of the Goodyear Tire and Rubber Company in conjunction with the Engineering Division of the Army Air Service. The construction in this country of the Navy rigid airship ZR-1 made necessary the production in this country of duralumin suitable for airship construction, the development of mechanical skill and technic in the fabrication of the materials, and the development of methods for the erection of an airship. As a result of the Navy's far-sightedness in its airship construction program, we have today in the United States, a duralumin industry and also workers skilled in the fabrication and erection of airship structure. This is undoubtedly a national asset when considered both from the standpoint of national defense and the commercial application of the airship to air navigation.

To prevent the recurrence of such accidents as occurred to the ZR-2 in England and to the Italian built "Roma," the Bureau of Aeronautics requested the National Advisory Committee for Aeronautics to appoint a special committee of experts to study the ZR-1 design and construction in detail, and a similar request was made by the Army Air Service in connection with the design of the Army semi-rigid RS-1. The special committee was made up of engineering experts outside the aeronautical industry. Three months were spent on the examination of the details of the design and construction of the ZR-1 and the report of the committee approved the design and methods of fabrication. The services of the men who

composed the special committee will undoubtedly be a valuable asset when commercial airships are constructed in this country, as they now possess a detailed knowledge of this type of aircraft development. Another airship, ZR-3, is now being constructed for the Navy Department by the Zeppelin Company in Germany. The airship is being turned over to the United States Government in connection with the adjustment of German reparations. With the airship construction program of the Army and Navy now in force, we shall have in this country before 1924 two or three airships of the most approved types. It is confidently expected that the operation of these airships in the United States will demonstrate their value as commercial carriers and will stimulate the commercial building and operation of airship lines in the United States.

Aircraft Engines

Progress in the development of aircraft engines has been largely limited to engines for military purposes. The Curtiss D-12 engine, which is a development of the Curtiss CD-12, made a remarkable showing in the Pulitzer Race in Detroit, the airplanes which took first and second places being equipped with engines of this model. It is also interesting to note that the airplanes which took third and fourth places were equipped with the Curtiss model CD-12. The Lawrance D-1, 9-cylinder radial air-cooled engine of 200 horsepower, was the first successful radial air-cooled engine developed in the United States, and is now in production. The Aeromarine model U-873 engine is capable of developing 275 horsepower, with a weight of 525 pounds. This engine was developed from the Aeromarine U-8-D. The first engine particularly designed as an airship power plant was developed by the Packard Company for the Navy, and develops 300 horsepower, and will be installed in the airship ZR-1. This engine has completed its official 300-hour endurance test, and has shown a performance equal in all respects to the best German airship engines. The Wright model D-2, 12-cylinder water-cooled engine, 500 horsepower, was developed for the Navy for a torpedo and bombing airplane. This engine has passed the endurance test, and developed approximately 600 horsepower, and weighs 1,100 pounds. The model W 700-horsepower engine designed by the Engineering Division of the Army Air Service has been constructed and tested.

Propeller Development

Propeller development during the year has been chiefly in connection with the development of an adjustable and reversible pitch

propeller, both by the Hart Adjustable and Reversible Propeller Corporation, of Los Angeles, and the American Propeller Company of Baltimore. Propellers developed by both these concerns have been given preliminary tests, but have not as yet been put into service. Another important propeller development is of the all-metal type, designed by S. A. Reed, and made and sold by the Curtiss Company. The Reed propeller is made of duralumin, forged from a bar, machined and formed to the proper pitch. The design has the advantage of being adapted to rapid production, and permits of the use of a thinner propeller section, which should increase the efficiency of the propeller over that of the ordinary type constructed of wood.

Helicopters

Helicopters have received considerable attention during the year 1922, the most noteworthy accomplishments being made by the Berliner helicopter and the De Bothezat helicopter, which latter was constructed under the direction of the Engineering Division of the Army Air Service. Both helicopters have made free flights which indicate substantial development.

Aircraft Instruments

The Pioneer Instrument Company, which has now taken over the Sperry patents, has continued its development work and placed several new instruments on the market. Notable among these instruments is the flight indicator, which combines a banking and turn indicator in one instrument. This company has also placed on the market an air distance recorder, operated by an air fan, which indicates both trip and season mileage. Another interesting instrument developed was the rate-of-climb indicator of the leak-tube type. The development of aeronautical instruments for special military purposes has been continued under the direction of the Army Air Service and the Bureau of Aeronautics, the most important item probably being the development for the Army Air Service of the earth inductor compass.

Aerial Photographic Equipment

The Fairchild Aerial Camera Corporation and the Eastman Kodak Company have contributed to the improvement of the aerial camera. Fairchild designed and built a new film magazine which permits clearer enlargements. A new film known as hypersensitized panchromatic film, several times faster than the old film, was introduced by Eastman.

CHAPTER XI

MOTORLESS FLIGHT; EARLY EXPERIMENTS AND THE REMARKABLE TRIALS OF 1922

THE art of soaring flight in motorless airplanes, popularly mistermed "gliders," progressed so far in 1922 that those who followed it closely predict that the near future will witness the practical application of the principles which enable the aviator to remain aloft for hours in a winged contrivance depending solely on uptrending air currents for its power to overcome the forces of gravity. It is seriously believed that in at least two respects soaring flight will become practical; one, development of inexpensive airplanes using engines of from 5 to 25 horsepower; and second, possibly the towing airplane, i. e., trains of cargo carrying motorless airplanes hitched to a strong motored plane much as a motor car pulls a trailer.

There was considerable research in motorless flight more than a half century ago. Later, Chanute [1832-1910] wrote a treatise in which he grouped under eight headings some twenty-three explanations for "sailing flight." They were: (1) Sailing flight and kite action; (2) rising trends in the wind; (3) propulsion obtained by tacking and circling; (4) different coefficients existing on front and rear of birds; (5) energy derived from combination gravity and wind; (6) energy to be derived from different speeds of wind strata; (7) energy derived from intermittency of wind force; (8) energy derived from variations in wind directions.

These conclusions resulted from Chanute's own observations and those of the French, among them Mouillard, Count d'Esterno, Baste, Goupil, Bretonniere, Soreau and Penaud, all of which were summed up by Professor Marey in his book *"Le Vol des Oiseaux,"* published in 1889. Lilienthal's work in Germany, however, was more practical, for he is credited with the first actual soaring flight of about 100 feet, made with a large bat-model machine in 1894.

Lilienthal's many flights led to conclusions which remain practical contributions to aerodynamics, particularly his work on wing curves and the air as a source of energy. When Lilienthal was killed in one of his flights in 1896, it was generally believed that downward currents crashed the plane, which had not then been perfected to retain constant rigidity.

The English, meanwhile, had been very active; Professor Hutton in 1864 had formed rather accurate conclusions by observing the flight of the albatross. The Duke of Argyl and Professor Pettigrew were contemporaries in similar research, to be followed soon after by Peal in India and Professor Proctor with advanced theories on soaring flight. Lieutenant Colonel Elsdale analysed air currents and Sir George Cayley compiled tables on equilibrium. Lord Rayleigh in 1883 suggested the use of parallel wings of different velocity for soaring, and this principle was used by Dr. Klemperer, the German scientist, in building his soaring plane which performed with marked success in 1922.

Work by Dr. Langley and Chanute

In America, Dr. Samuel Pierpont Langley, the scientist and astronomer, collected data on the findings of other workers and after intense research work, formulated certain principles which remain standard today. His works, "Experiments in Aerodynamics," published in 1891, and "The Internal Work of the Wind" in 1893, are authoritative textbooks on soaring flight. His models, both large and small, were flown successfully; and it is worthy of note that Manneyrol's record flight at the English gliding meet in 1922 was made in a soaring plane with tandem wings similar to the "Langley airdrome."

For years, however, Octavus Chanute had been one of the leading American experimenters. His long research in the methods of others combined with increasingly important work of his own culminated in 1896 in a series of gliding flights (he would not term them soaring flights) on the shores of Lake Michigan. The conclusions he drew from these flights might have been written in 1922, so aptly do they describe the conditions necessary for sustained flight. Chanute's assistants, Herring and Avery, made many flights in machines at first built according to Lilienthal's models, and later to their own design. Pilcher and Huffaker were others who contributed to contemporary knowledge, Huffaker insisting that soaring flight must be accomplished with strong machines. Hiram Maxim, Professor Zahm and others here and abroad contributed considerable knowledge to aeronautics by means of constant experiments.

Flights by Wright Brothers

A majority of the scientists, however, were not trying to perfect means of soaring flight except in so far as it applied to artificial or motor-powered aviation. It apparently was their aim to make a practical airplane. It was in the course of their airplane development that the Wright Brothers long before their first motor driven

flight on December 17, 1903, actually made soaring flights of such character as to convince them that motorless flight would be practical, providing one had sufficient knowledge of the wind currents and at the same time possessed a properly constructed machine. They so improved their "gliders" that the short hops of Lilienthal and Chanute were eclipsed by real soaring flights in which Orville and Wilbur Wright often remained stationary in the air.

In 1911, eight years after their first flight by motor driven airplane, Orville Wright established the soaring flight record at Kitty Hawk, N. C., remaining aloft 9 minutes and 45 seconds. Starting from a sand dune 75 feet high he arose 230 feet and hovered over the same spot nearly nine minutes.

This record stood until Klemperer's 6-mile flight in Germany in 1921, which lasted 13 minutes, 3 seconds. The Germans had been doing considerable experimenting prior to the war. Their technical universities turned out graduates and students each year thoroughly versed in the principles of soaring flight. As a result when the Peace terms restricted motor driven flight in Germany the students and professors turned their attention to soaring flight. On September 6, 1921, the world's soaring record was wrested from Klemperer by Martens, a student at Hanover Technical University, who soared for 15 minutes and 40 seconds over the Wasserkuppe in Germany. He flew the noted Hanover plane, the *"Vampyr,"* which was designed by Dr. George H. Madelung, then a professor at the school, and a noted aviator. Dr. Madelung is now engineer for the Glenn L. Martin Company at Cleveland, Ohio. He believes that soaring flight will result in small powered planes and other motorless craft capable of being hitched to an airplane and flown through the skies like a train. The 1921 soaring record was won finally by Harth, who on September 13th, that year, made a flight of 21 minutes and 37 seconds, alighting at a spot only 35 feet below his starting point, a feat which was accredited to his knowledge of aerology and to the topography of that section of the Rhön mountains over which he soared.

There were many other schools represented in the 1921 flights in Germany; and this actually served to again quicken interest in soaring flight throughout the world. The French and English particularly sought information and the American public was slowly being interested in the scientific sport.

American Experiments in 1922

In August 1922, the French held their international experimental congress of motorless airplanes at Mount Combegrasse, near Cler-

mont Ferrand. Forty planes were entered, including American machines and team from the Massachusetts Institute of Technology. A majority of the craft, however, were little else than motorless airplanes. Others were of the bat type with flapping wings, others resembled flying fishes and still others beyond description.

The American team was captained by Edmund T. Allen, of Chicago, a former test pilot in the U. S. Air Service and a student at M. I. T. With him were Otto C. Koppen, a junior at the school, who was chief designer of the two planes; Harry C. Karcher, a first-year man, and Lee A. Agnew, a junior. The team represented the Aeronautical Society of the M. I. T.; but private contributions from patriotic Americans aided in defraying the expenses of the trip which took the Team from France to Germany.

The American plane was light, weighing but 80 pounds. The German *"Vampyr"* was twice as heavy. None of the German planes participated in the French contests which were of little importance from the viewpoint of results attained. The longest flight, that of Douchy, covered a distance of some five miles in 9 minutes and 2 seconds, less than Orville Wright's flight in 1911. Boussoutrot, the famous French pilot, in a plane which was actually a sport model Farman without the engine, had the most time in the air, in all 49 minutes and 59 seconds, while Allen, the American, was seventh on the list with 12 minutes and 27 seconds total time to his credit.

The French explained the poor showing of all contestants as compared with what the Germans had done by saying that the location of the meet was wrongly chosen; that under similar conditions they could excel the German pilots and planes; but observers were of the opinion that the fault lay in inexperience both in designing soaring planes and handling them, that is, the pilots did not have sufficient knowledge of air currents. It was pointed out that soaring is a simple matter for a pilot, but in order to remain up for any period he must know the currents and take advantage of them. Later on, the French pilots agreed that the Germans were right in stressing the importance of special planes and special knowledge for soaring.

Flights in Germany

The German contests in 1922 were most sensational. Hundreds of flights were made, with only one minor accident and no injuries; and it was demonstrated finally that soaring planes can remain aloft for prolonged periods. The Germans made flights over the Wasserkuppe lasting hours, the results of two years prior experience. The Wasserkuppe, 3115 feet above sea level, forms a westerly

ridge, while the Pferdskopf, 2,825 feet high, forms the southern end a quarter of a mile away. Between those points on the ridge facing the western flats extremely powerful uptrends of air were found when the wind blew from the west. Here came professors and students from the Universities of Hanover, Darmstadt, Stuttgart, Berlin, Dresden, Aachen (Aix-la-Chappelle) and Munich. Contrary to the prevailing opinion the pilots and other members of the teams were not students as the word is understood in America, but rather, were technical men preparing for degrees in the various sciences. Scientists and observers gathered from all countries, with the exception of France. Among the American observers were Colonel Foulois, Military Attaché at Berlin, and Professor E. P. Warner, of the aeronautics department at Massachusetts Institute of Technology.

Martens in his *"Vampyr"* set out by breaking his old record, remaining aloft 43 minutes, climbing 320 feet in a flight of 6 miles. Following shortly F. H. Hentzen, also piloting the *"Vampyr,"* made a flight of 1 hour and 45 minutes and climbed 700 feet. He first made a long flight of 2 hours and 10 seconds—all duration flights being made from the west ridge. A few days later, Hentzen remained up 3 hours and 6 minutes. There were three planes up at once—Hentzen in the *"Vampyr,"* Martens in the Hanover *"Greif,"* and Hackmack in the *"Darmstadter."* All three maneuvered aloft some 800 feet above the mountain top. At the end of an hour Martens happened to slip out of the soaring region and was forced to land. The others remained up, cutting figure eights, but always remaining in the uptrend. At times they hung motionless, once for fifteen minutes, quite near to each other so that the spectators on the ground could hear the two competitors conversing. Occasionally Hentzen arose to 1,100 feet. After a flight of 1 hour and 46 minutes Hackmack slipped out of the uptrend and failing to creep back was forced to land. Hentzen remained up another hour—in all 3 hours and 6 minutes. When he landed he said he believed he could have remained there indefinitely had it not been for darkness. As it was, the valley was in complete darkness and the crowds below nothing but shadows when he slipped out over the ridge for a landing.

The American team arrived at the Wasserkuppe after the contests had closed, but many teams were still there experimenting. Allen's first flight was from a gentle slope, and the plane proved too light for the men who were giving it the initial pull and an accident was narrowly avoided. Later, he made another flight, but his plane was so light that on the start it was shot into a sharp climb which forced him to dive; and in so doing he could not possibly avoid

leaving the soaring region. Instead of circling aloft, he was compelled to head for the woods and it was felt that he could not clear them; but he received an unexpected boost from the uptrend at the lower slope; and by very skillful piloting he cleared the trees by a narrow margin and settled in the meadow. He was seriously injured in a later flight when he was buffeted down by strong gusty winds. The Dutch engineer, Fokker, arrived at the Wasserkuppe after the contests, bringing two biplanes, too light and with wings too short for soaring planes, as the Germans pointed out. Later he carried a passenger and remained aloft for 13 minutes under perfect soaring conditions and through sheer ability as a pilot.

Curtiss Flights in America

Glenn H. Curtiss during the Summer and Fall of 1922 built and experimented with a flying boat glider. These experiments led some to believe that he was challenging the extended gliding flights accomplished abroad, but this was not the case. The Curtiss Glider is distinctly a water machine. The purpose of the machine was threefold; first, to obtain data for developing a suitable glider and controls for use as a target; second, to find out how to tow such a machine to the required altitude behind a motor driven airplane and then cut it loose for gliding or soaring, and, third, to accomplish soaring over water which until now has been practiced only by sea birds. Both the first and second aims were achieved. In the second case not only was the problem of launching and cutting loose at altitude satisfactorily solved (first from a motor boat and then from a large flying boat) but in the later experiments the soaring machine was towed into and through the air with a man aboard by a large flying boat. Many glides were made and a great deal of valuable information accumulated before winter stopped further experimentation. The work is expected to be resumed in 1923.

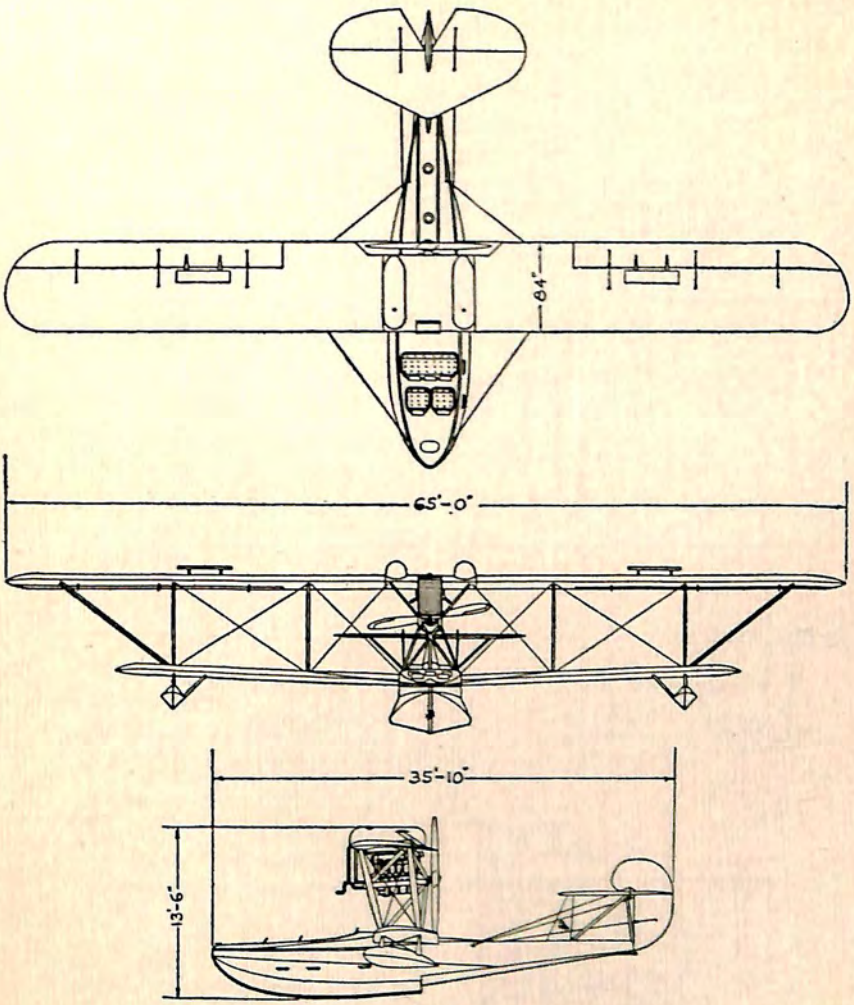
Specifications of the machine are as follows:

Weight—light		150 lbs.
Weight with pilot		310 lbs.
Wing surfaces with ailerons	area	280 sq. ft.
Ailerons—four	area	18.7 sq. ft
Horizontal stabilizer	area	19.5 sq. ft.
Elevator	area	10 sq. ft.
Vertical stabilizer	area	8.2 sq. ft.
Rudder	area	6.8 sq. ft.
Stalling speed		20.2 M.P.H.
Best gliding angle		13 to 1
Speed at best gliding angle		28 M.P.H.

Frenchman Holds Record

In November 1922 the British international contests were held over the English downs near Brighton; and it was there that many English planes, several of them hastily made and flown by pilots without experience, succeeded in remaining aloft often more than an hour. Then again it was here that the Frenchman Manneyrol in his tandem plane broke the record for the year—remaining aloft 3 hours and 21 minutes. His feat attracted much attention among aeronautical engineers for the plane was of a type which had been relegated to the past as a freak form of no particular aerodynamical value. Nevertheless Manneyrol held the world soaring record for 1922, despite the fact that the Germans had done more soaring and had virtually given to the world the latest authoritative data concerning wind currents and how to use them in soaring flight. The European contests attracted so much attention in the United States that it was planned to hold similar contests in this country in 1923.

AIRCRAFT AND ENGINE DESIGN SECTION

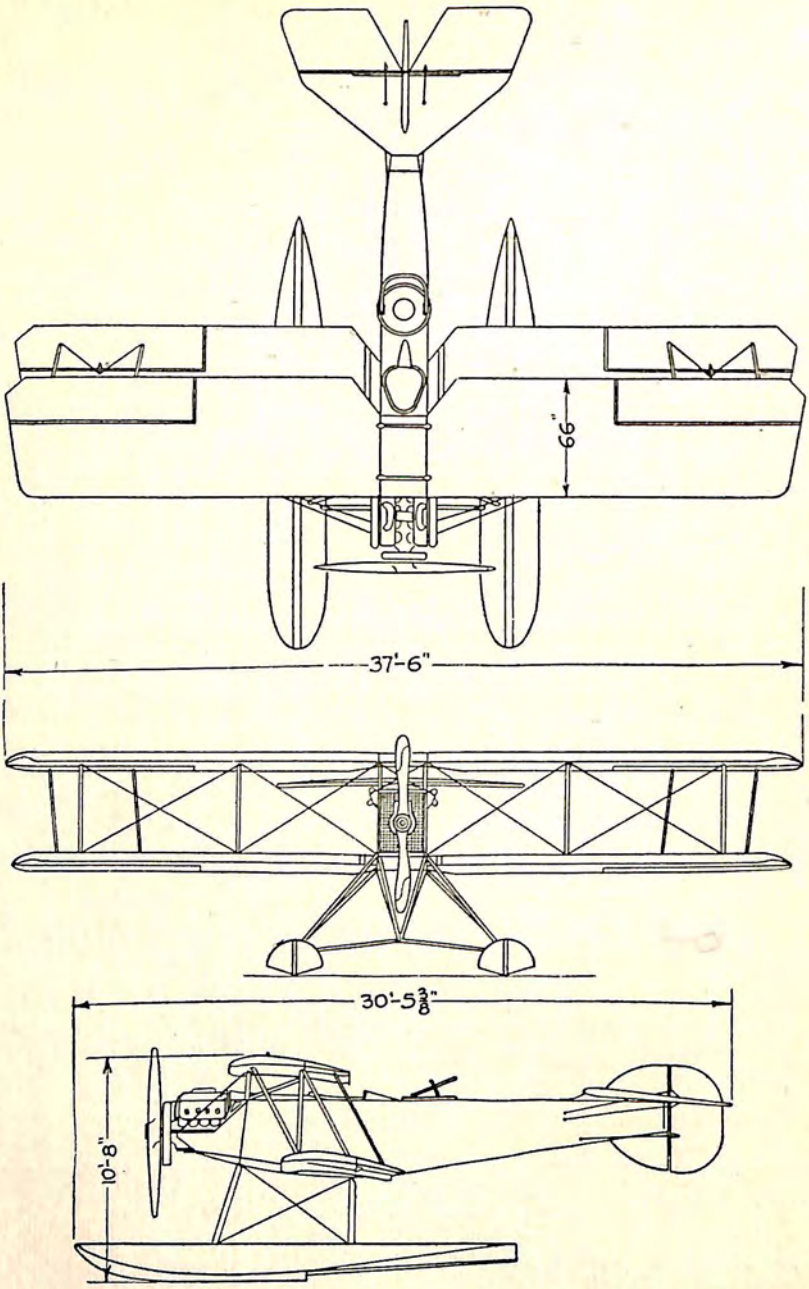


AEROMARINE PLANE AND MOTOR COMPANY

KEYPORT, N. J.

TYPE: COMMERCIAL PASSENGER MODEL: A M C

ENGINE: LIBERTY 400 H.P. SPEED: 50-95 M.P.H. CLIMB: 3300 FT. IN 10 MIN.

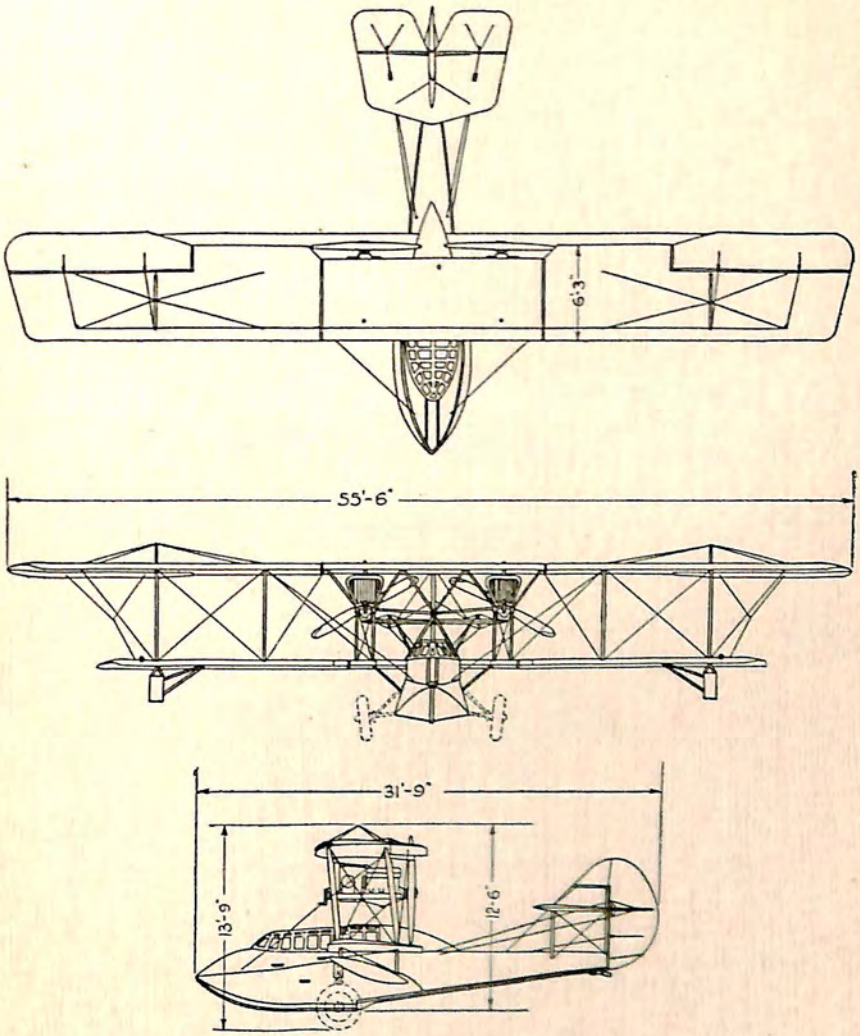


AEROMARINE PLANE & MOTOR COMPANY

KEYPORT, N. J.

TYPE: NAVY SPOTTING & RECONNAISSANCE MODEL: AS-2

ENGINE: WRIGHT TYPE H SPEED: 56-117 M.P.H. CLIMB: 7300 FT. IN 10 MIN.

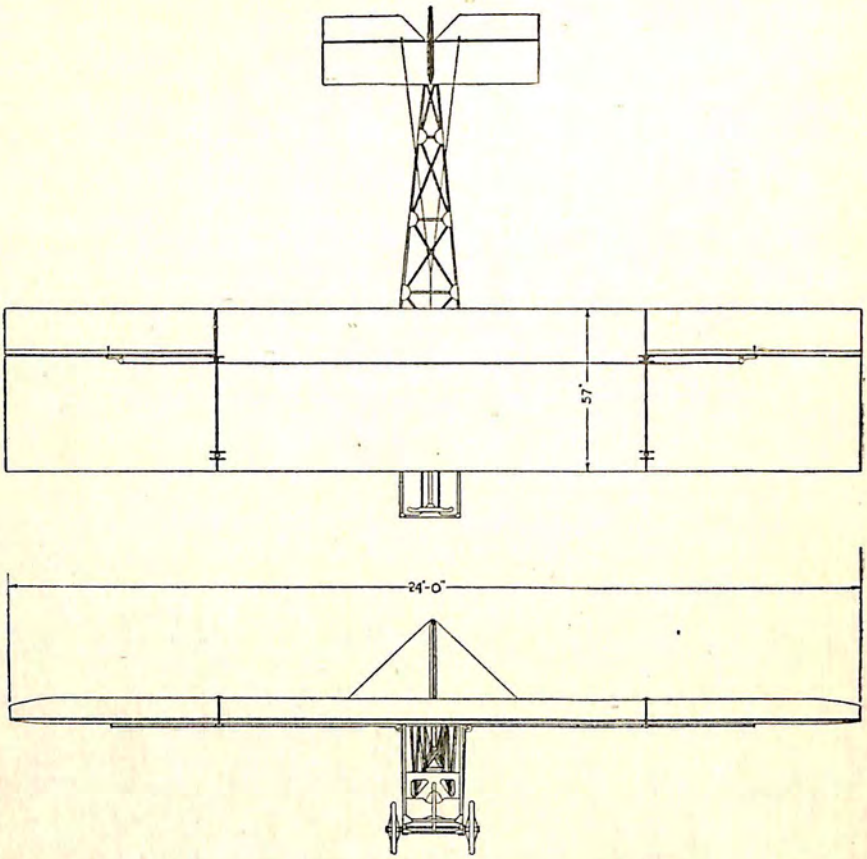


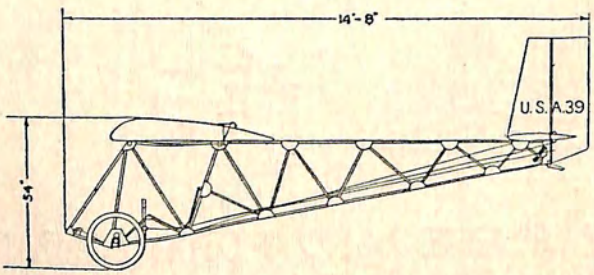
AEROMARINE PLANE AND MOTOR COMPANY

KEYPORT, N J.

TYPE · PASSENGER LIMOUSINE FLYING BOAT MODEL 60

ENGINE: AEROMARINE U-8-D B.H.P: 250 SPEED: 50-105 M.P.H CLIMB 6500 FT IN 10 MIN.

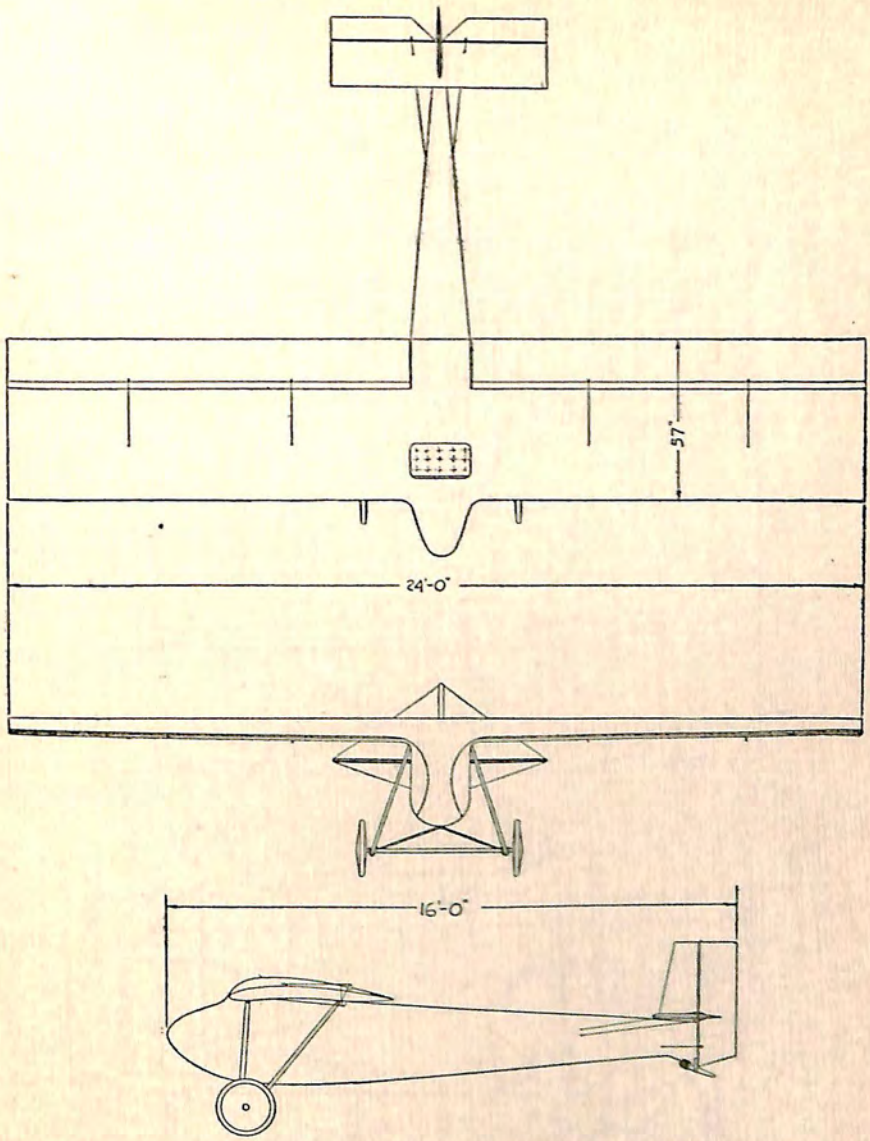




AERONAUTICAL ENGINEERING SOCIETY

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

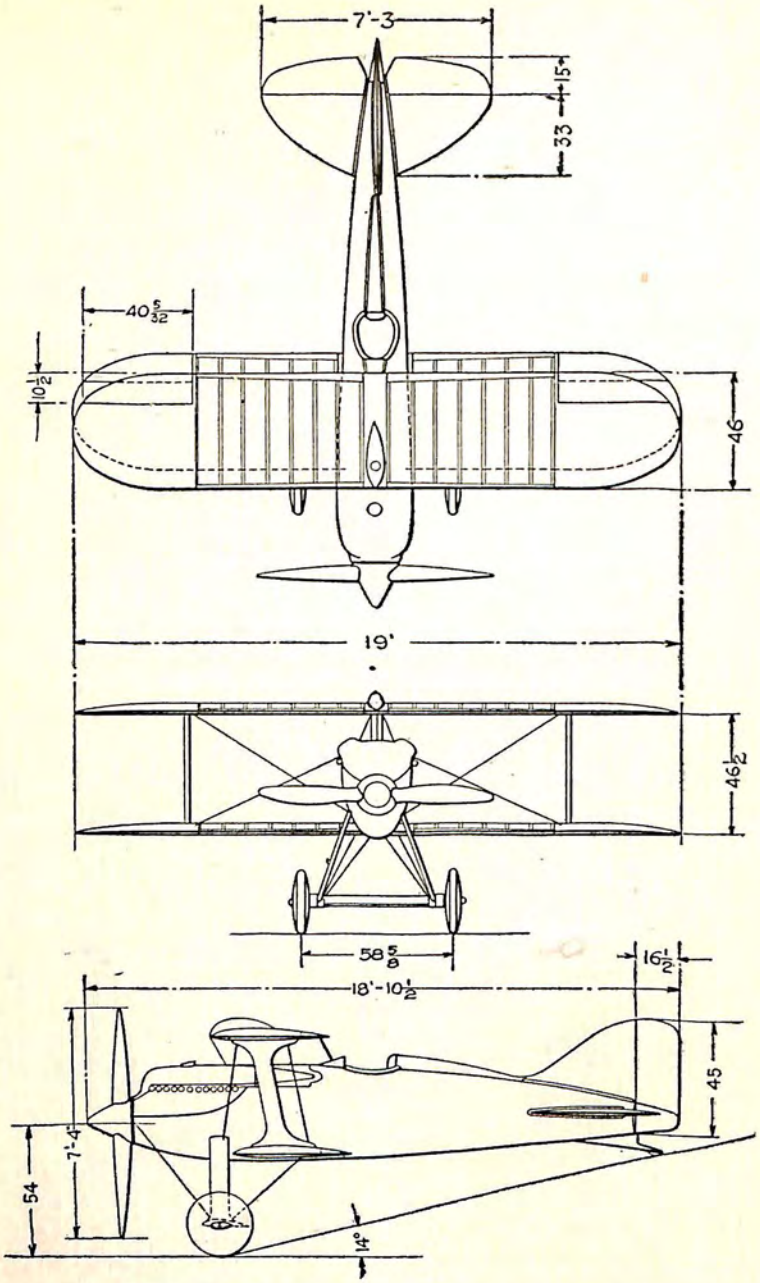
GLIDER Nº 1



AERONAUTICAL ENGINEERING SOCIETY

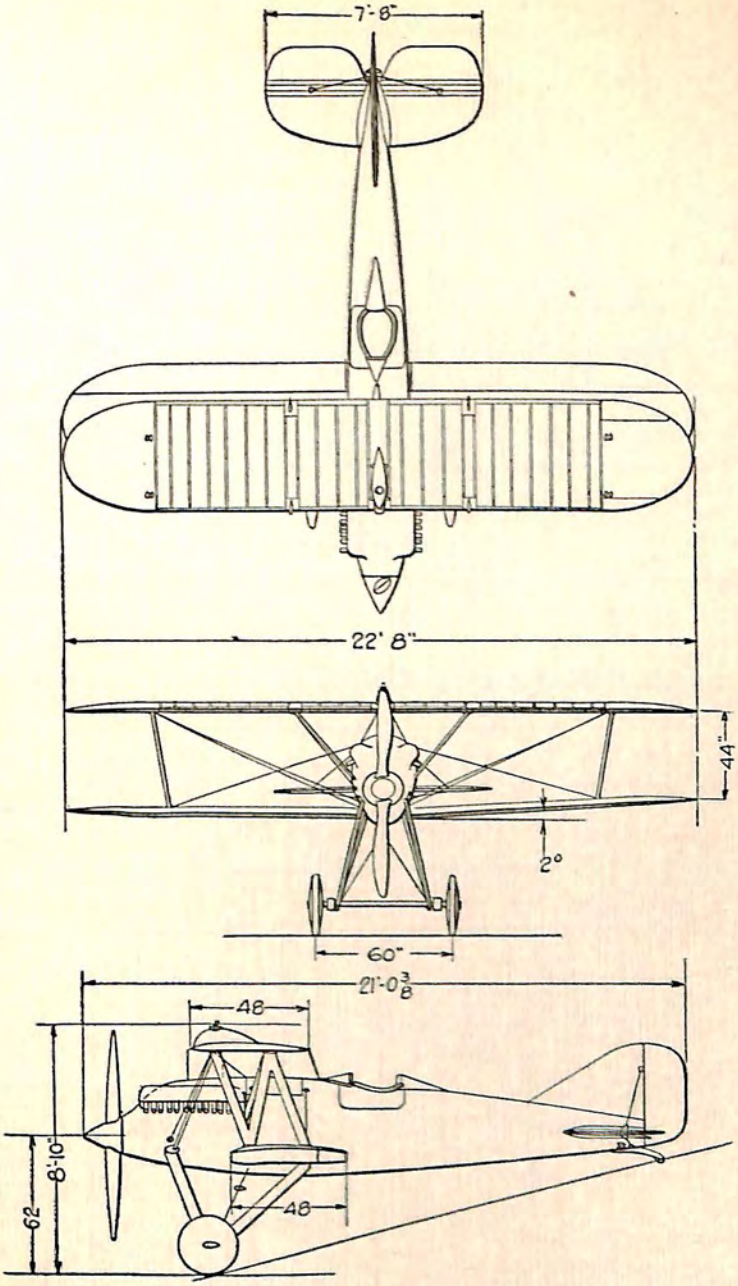
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

GLIDER Nº 2



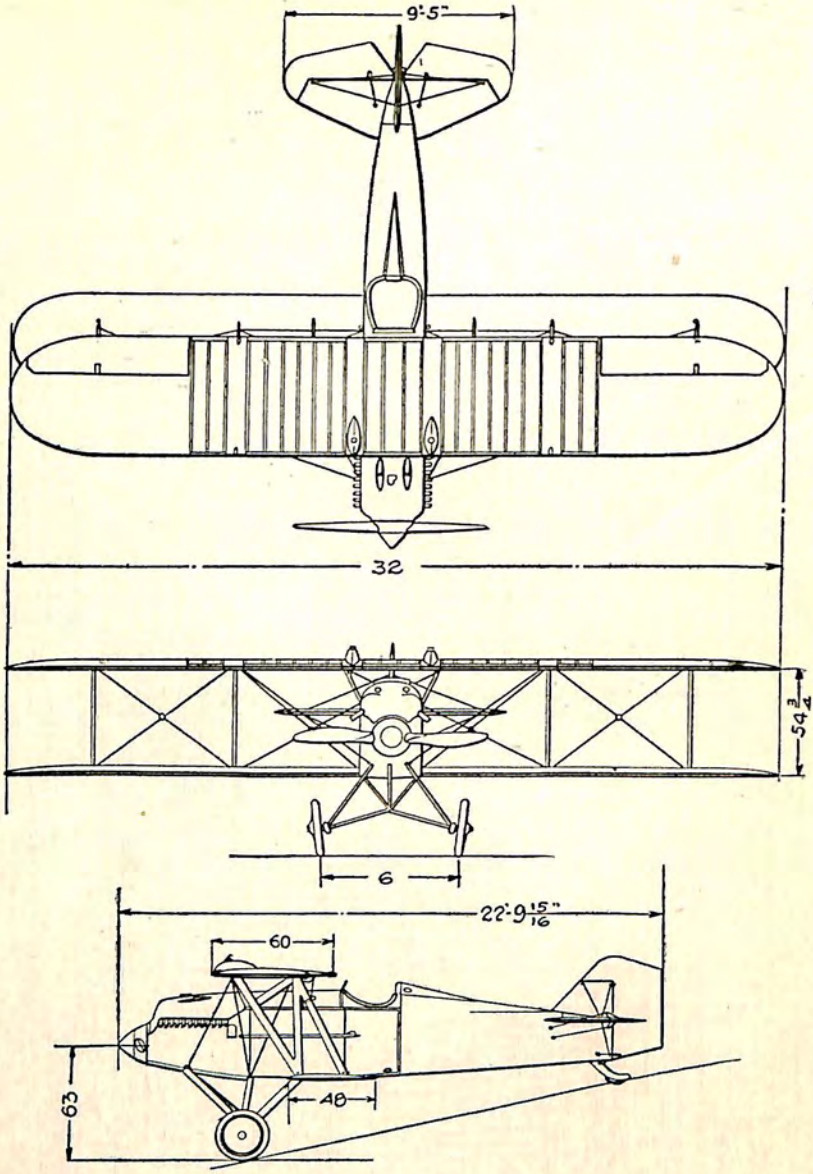
THE CURTISS AEROPLANE AND MOTOR CORPORATION
GARDEN CITY, L.I.N.Y.

1922 ARMY-CURTISS RACER-CURTISS D.12 MOTOR
400 H.P. — 240 M.P.H.



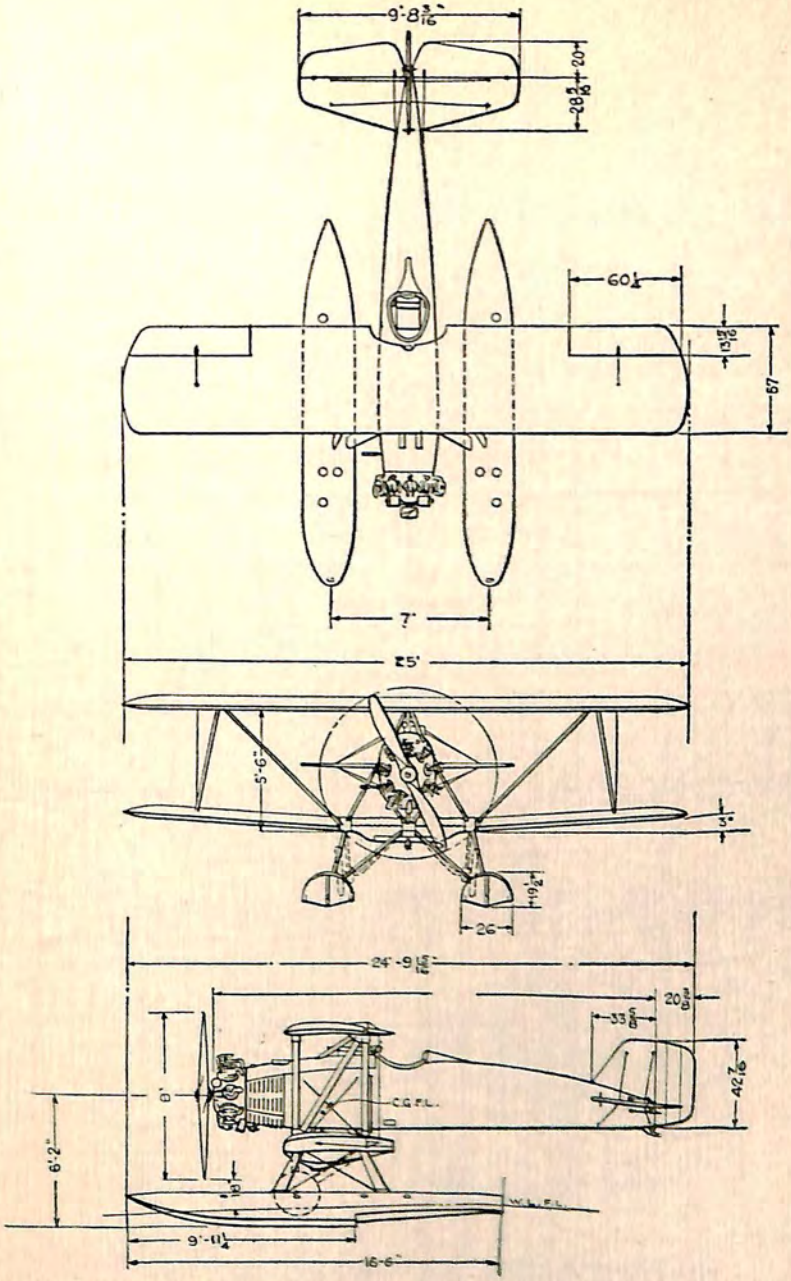
THE CURTISS AEROPLANE AND MOTOR CORPORATION
GARDEN CITY, L.I.N.Y.

1922 NAVY CURTISS RACER — C D-12 MOTOR
375 H.P. — 200 M.P.H.



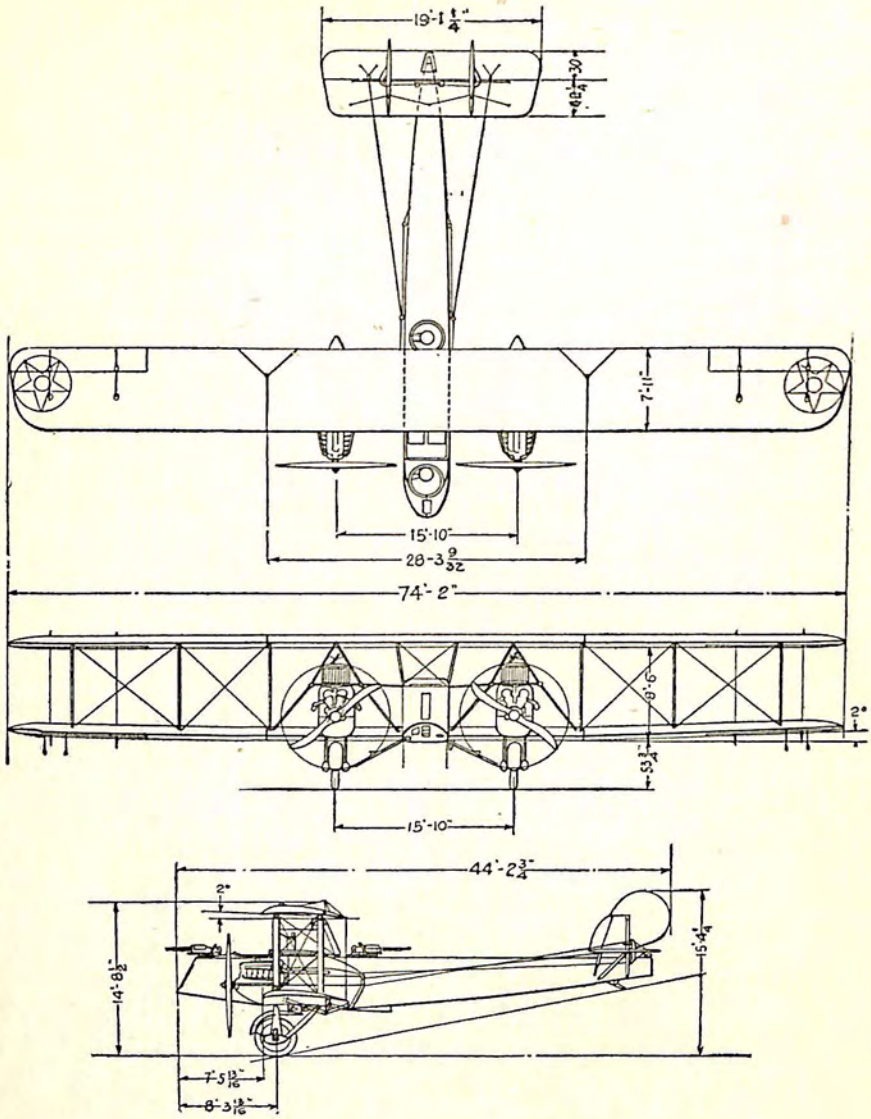
THE CURTISS AEROPLANE AND MOTOR CORPORATION
GARDEN CITY, L.I. N.Y.

1922 CURTISS PURSUIT PLANE — D-12 MOTOR
400 H.P. — 170 M.P.H.
CLIMB 14,700 FT. IN 10 MIN.
27,800 FT. SERVICE CEILING ABSOLUTE CEILING 29,300 FT.

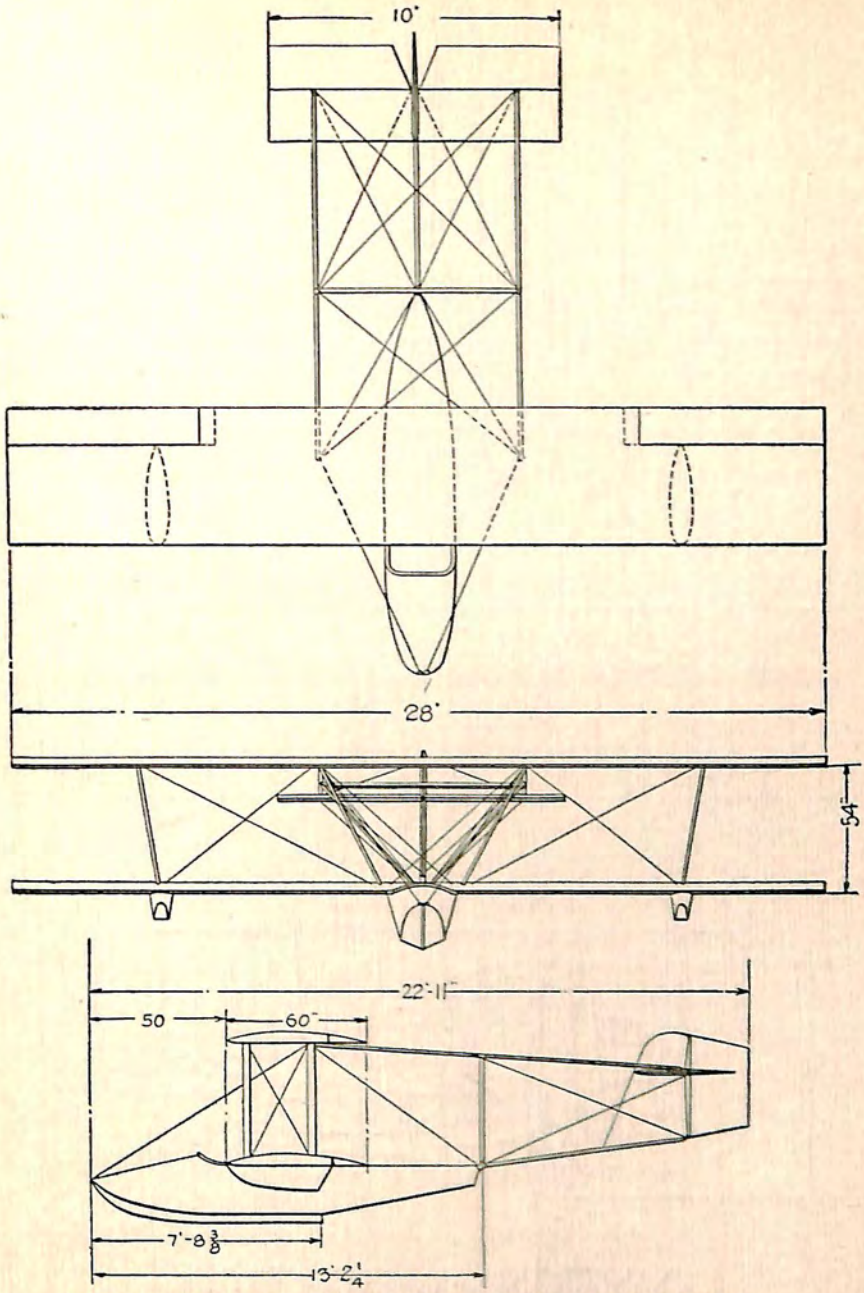


THE CURTISS AEROPLANE AND MOTOR CORPORATION
GARDEN CITY, L.I.N.Y.

NAVY CURTISS T.S. – WRIGHT J.I. (LAWRANCE TYPE) ENGINE.
220 H.P. – 122 M.P.H. SEAPLANE – 130 M.P.H. LAND PLANE
13,500 FT. SERVICE CEILING

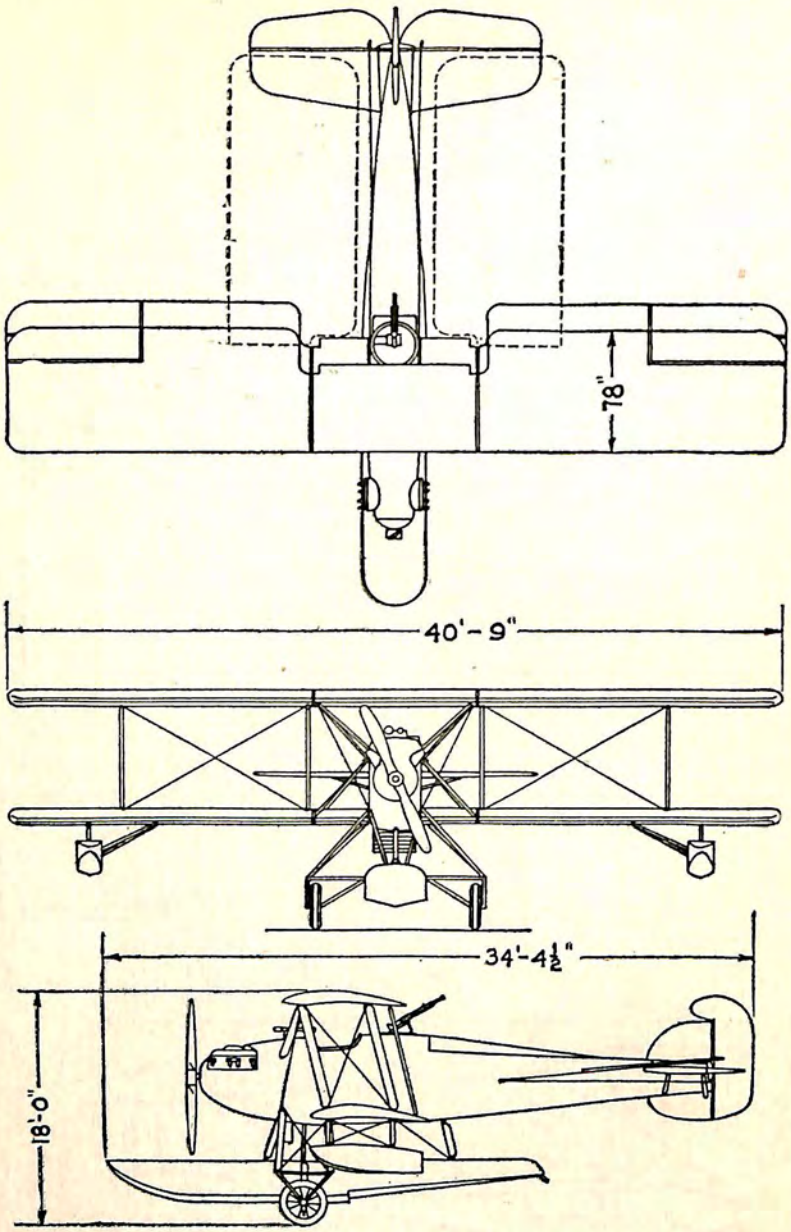


THE CURTISS AEROPLANE AND MOTOR CORPORATION
GARDEN CITY, L.I.N.Y.
N.B.S-1 BOMBER-CURTISS – TWO LIBERTY 12 MOTORS
EACH 400 H.P. EACH 97 M.P.H.
CEILING 10,000 FT.



THE CURTISS AEROPLANE & MOTOR CORPORATION
GARDEN CITY, L.I.N.Y.

CURTISS GLIDER-WING AREA 280 SQ.FT - WEIGHT, EMPTY 150 LBS.
GLIDING ANGLE 13 TO 1

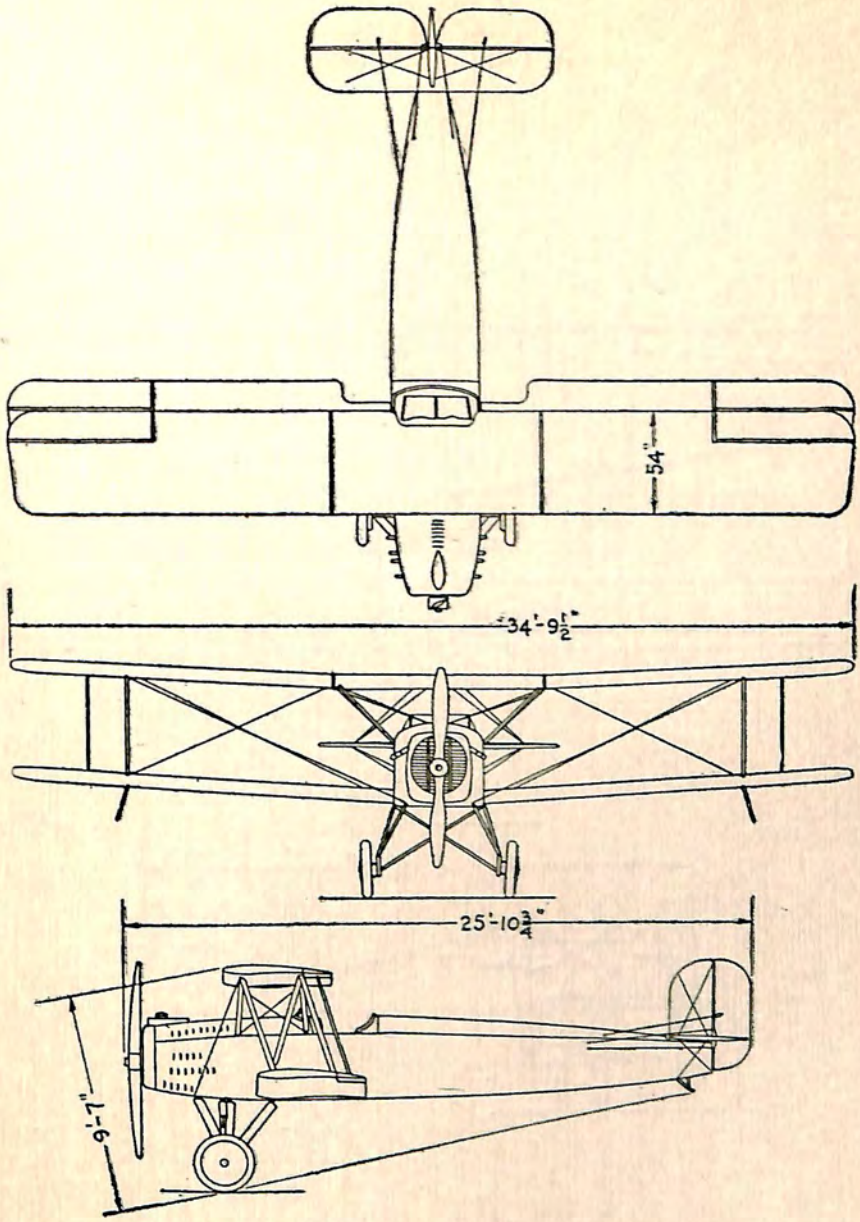


DAYTON WRIGHT CO.

DAYTON, OHIO.

TYPE : SHIPBOARD MODEL: W.A.

ENGINE: WRIGHT H-3 340 H.P. SPEED: 45-110 M.P.H.

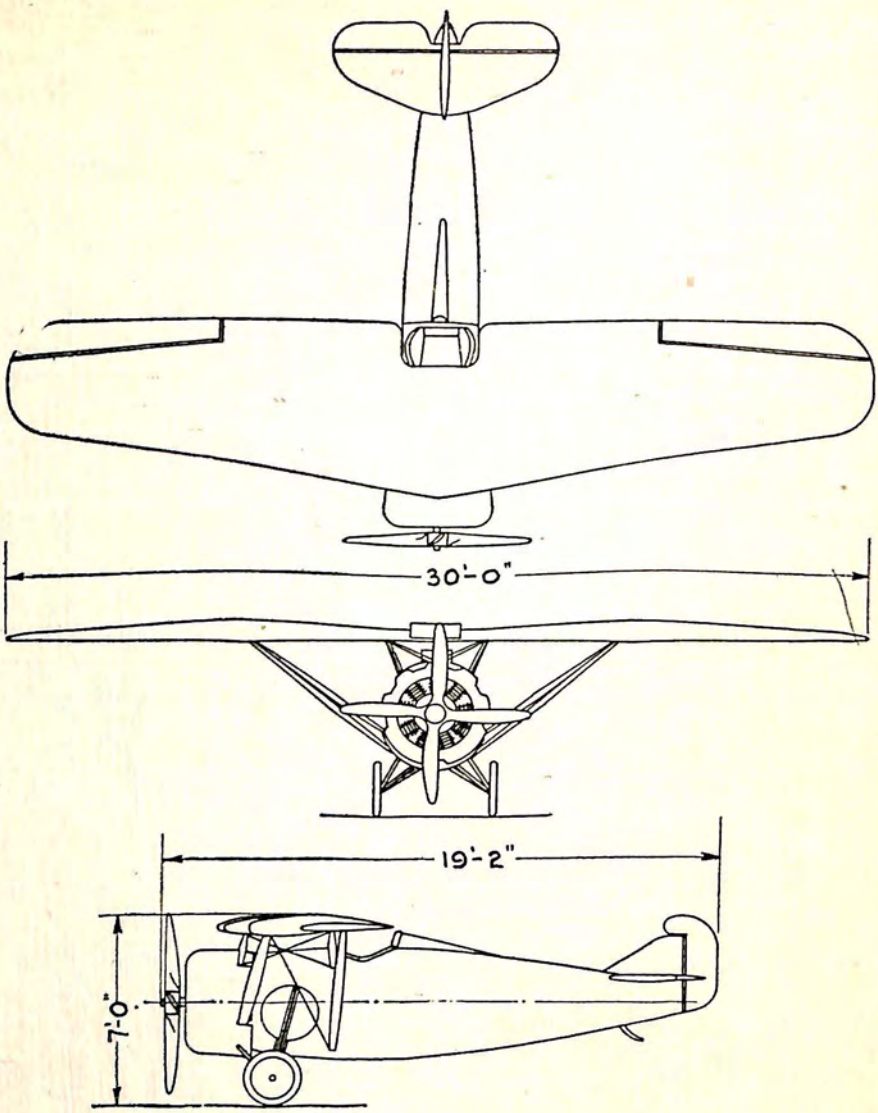


DAYTON WRIGHT CO.

DAYTON, OHIO.

TYPE: TRAINING
ENGINE: WRIGHT E 180 H.P.

MODEL: T.W.3
SPEED: 45-115 M.P.H.

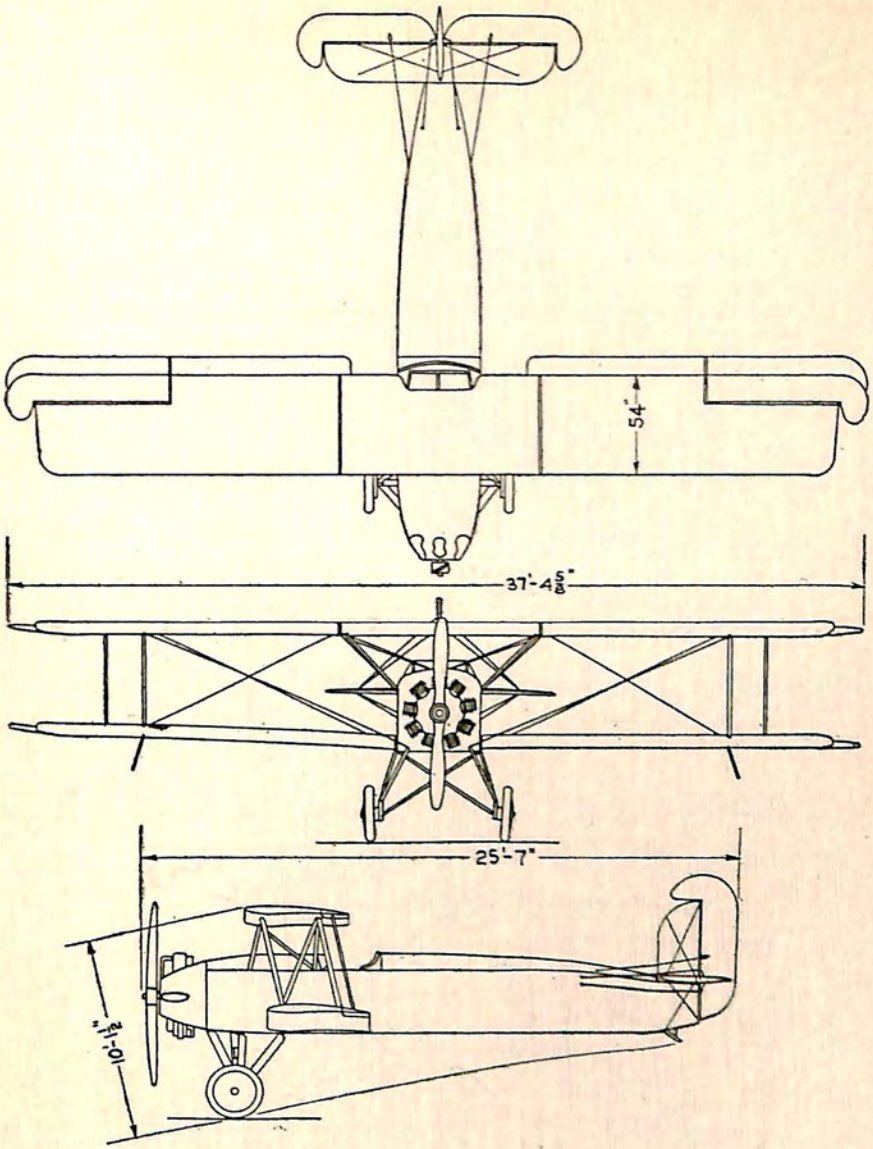


DAYTON WRIGHT CO.

DAYTON, OHIO.

TYPE: PURSUIT – MODEL: P.S.I. – SPEED: 50-100 M.P.H.

ENGINE: WRIGHT J.I. 200 H.P.(LAWRANCE TYPE)

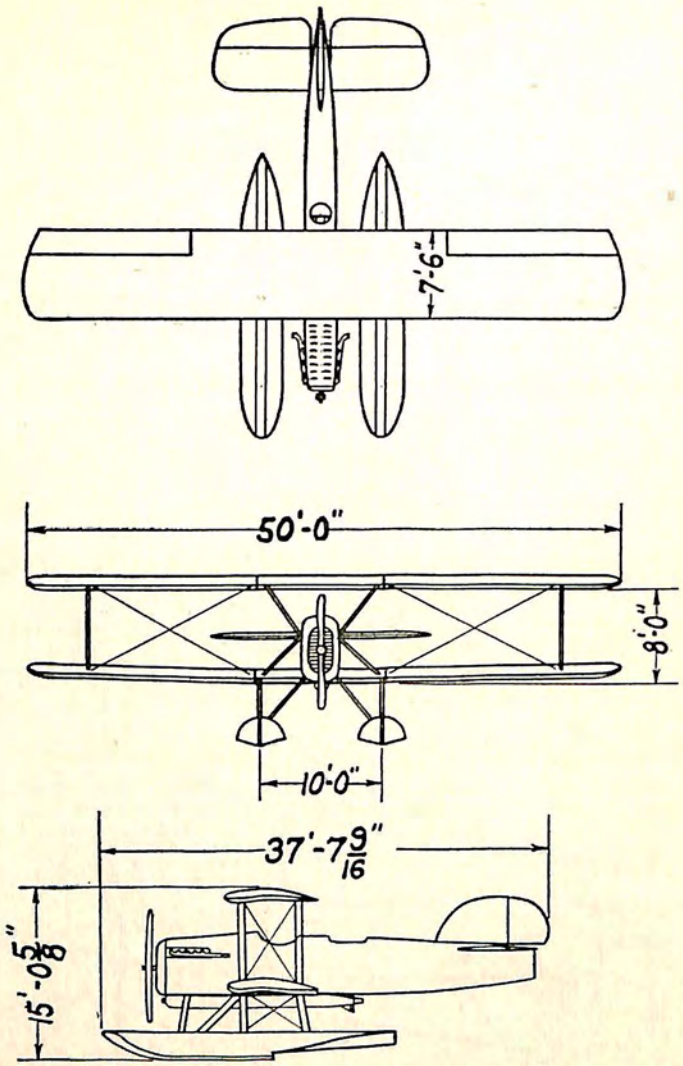


DAYTON WRIGHT CO.

DAYTON, OHIO

TYPE: TRAINING - MODEL: T.A.5 - SPEED: 45-115 M.P.H.

ENGINE: WRIGHT J.I 200 H.P. (LAWRANCE TYPE).



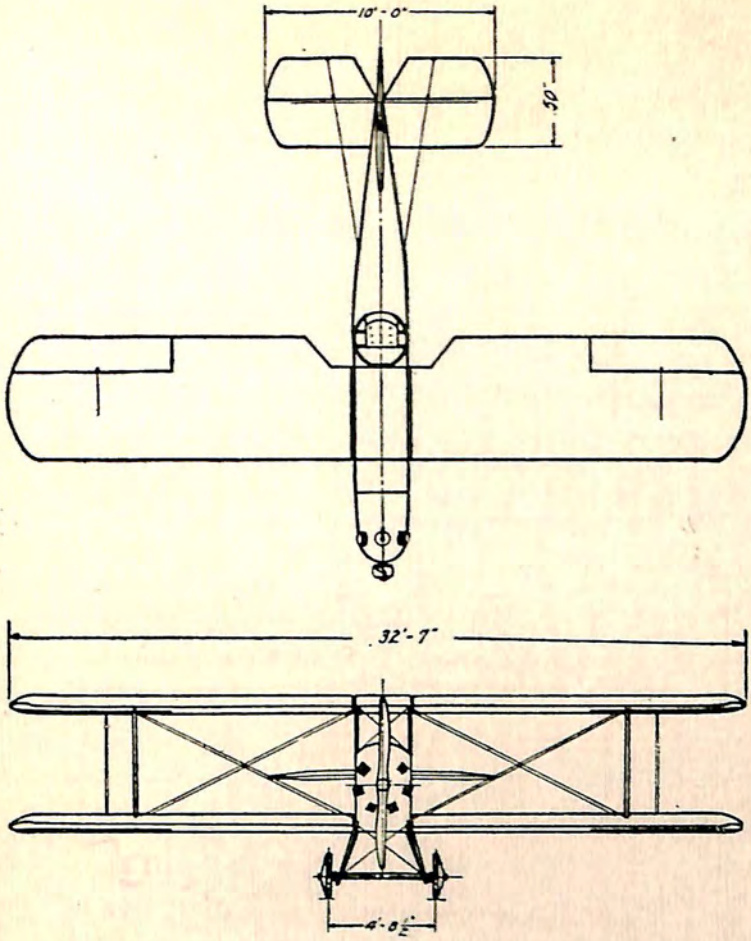
THE DOUGLAS CO.

SANTA MONICA, CAL.

TYPE: TWIN PONTOON SEAPLANE MODEL: DT-2

ENGINE: LIBERTY 450 H.P. SPEED: SEA LEVEL 100 M.P.H.

SERVICE CEILING: 6500 FT. CLIMB: 3000 FT. IN 10 MIN.

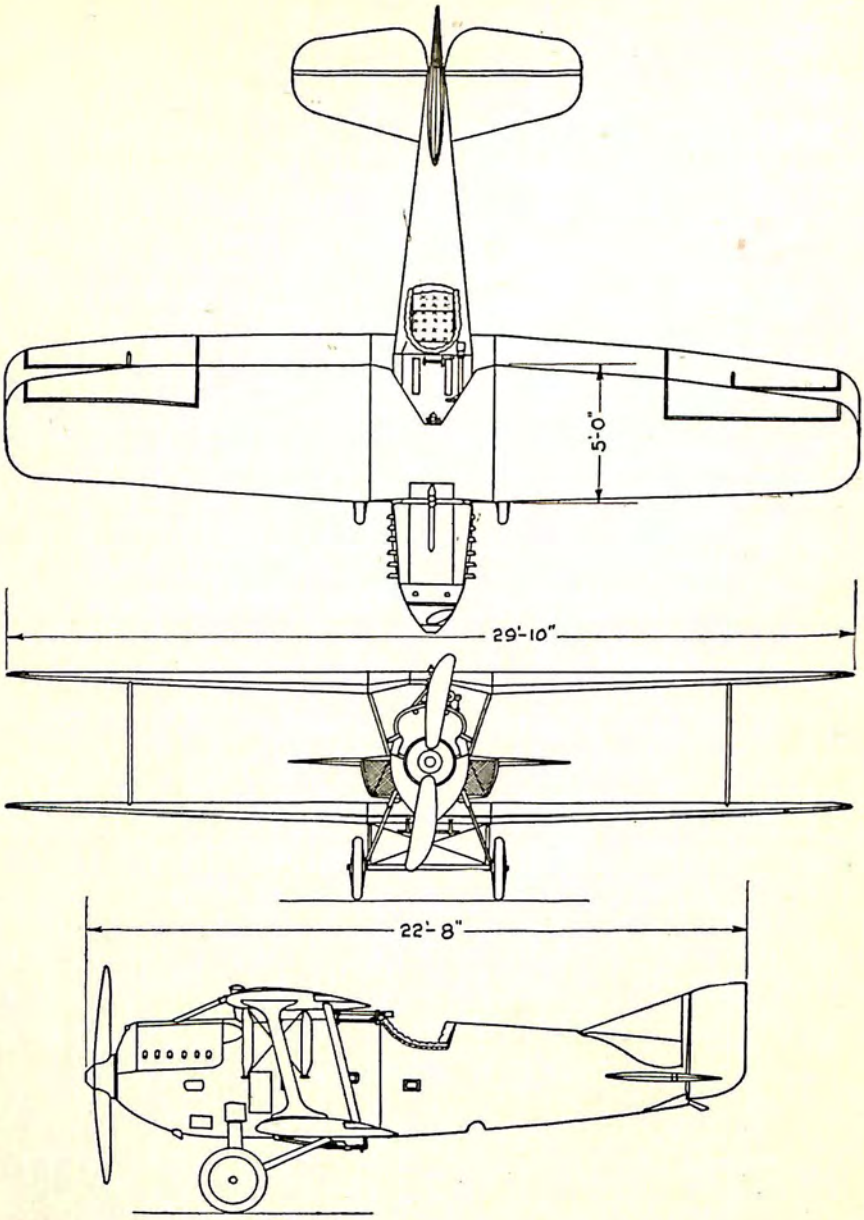


G. ELIAS & BRO., INC.

BUFFALO, N.Y.

TYPE: MODEL: T.A-1

ENGINE: 170 H.P. A.B.C. WASP

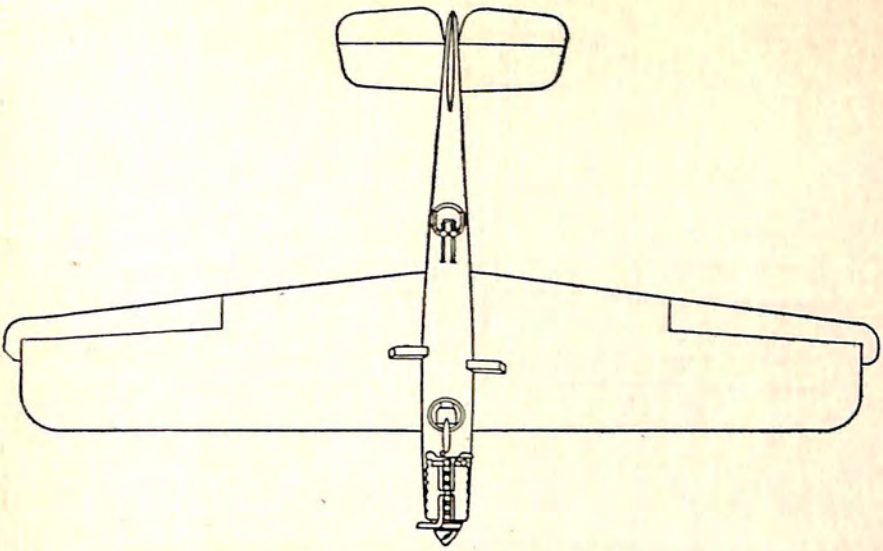


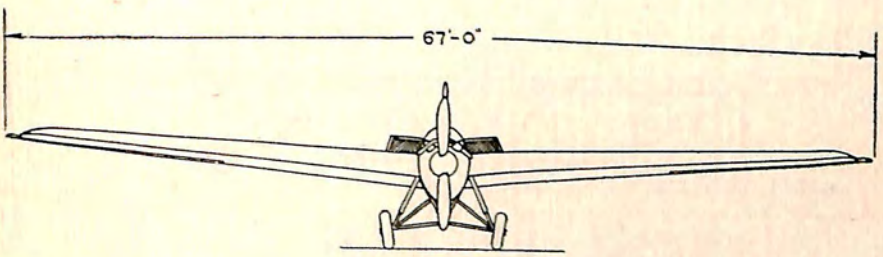
GALLAUDET AIRCRAFT CORPORATION

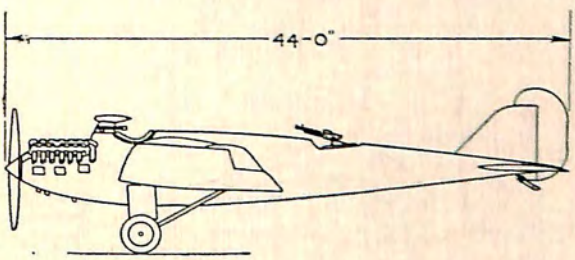
EAST GREENWICH, R.I.

TYPE : PURSUIT MODEL : ALL METAL

ENGINE : PACKARD 328 H.P.





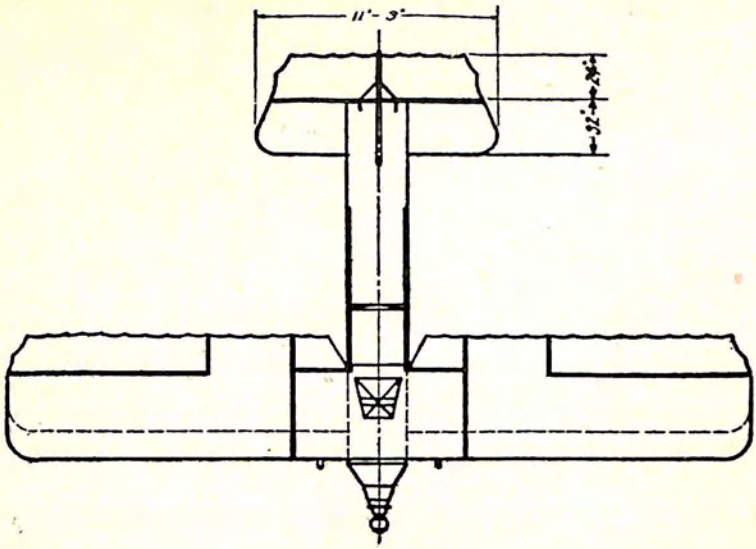


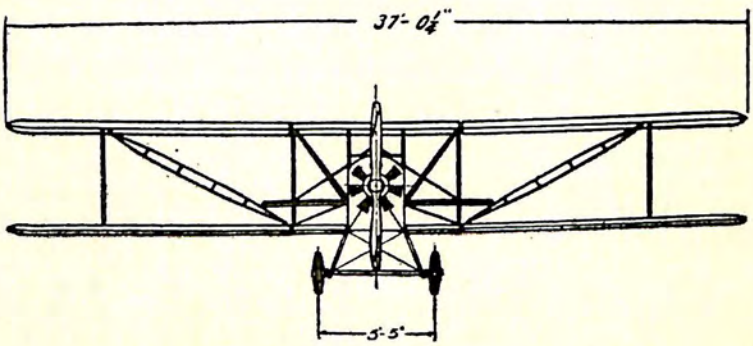
GALLAUDET AIRCRAFT CORPORATION

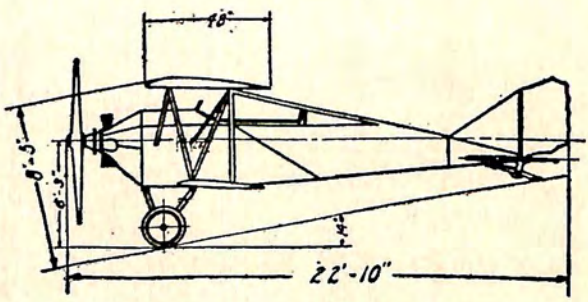
EAST GREENWICH, R I.

TYPE: DAY BOMBARDMENT MODEL: ALL METAL

ENGINE: MODEL W 700 H.P.





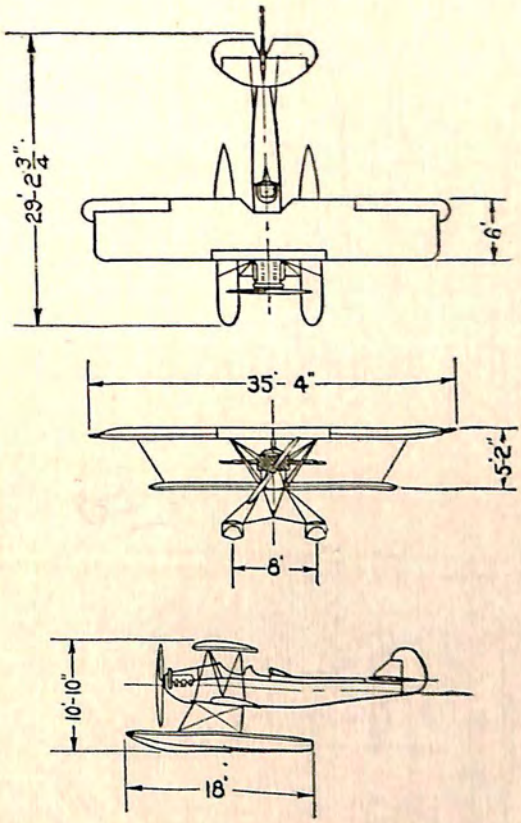


HUFF DALAND & CO.

OGDENSBURG, N.Y.

TYPE: TRAINING MODEL T.A. 2. SPEED 45-118 M.P.H.

ENGINE: WRIGHT 140 H.P. (LAWRANCE TYPE) - CLIMB: 1070 FT. PER MIN.

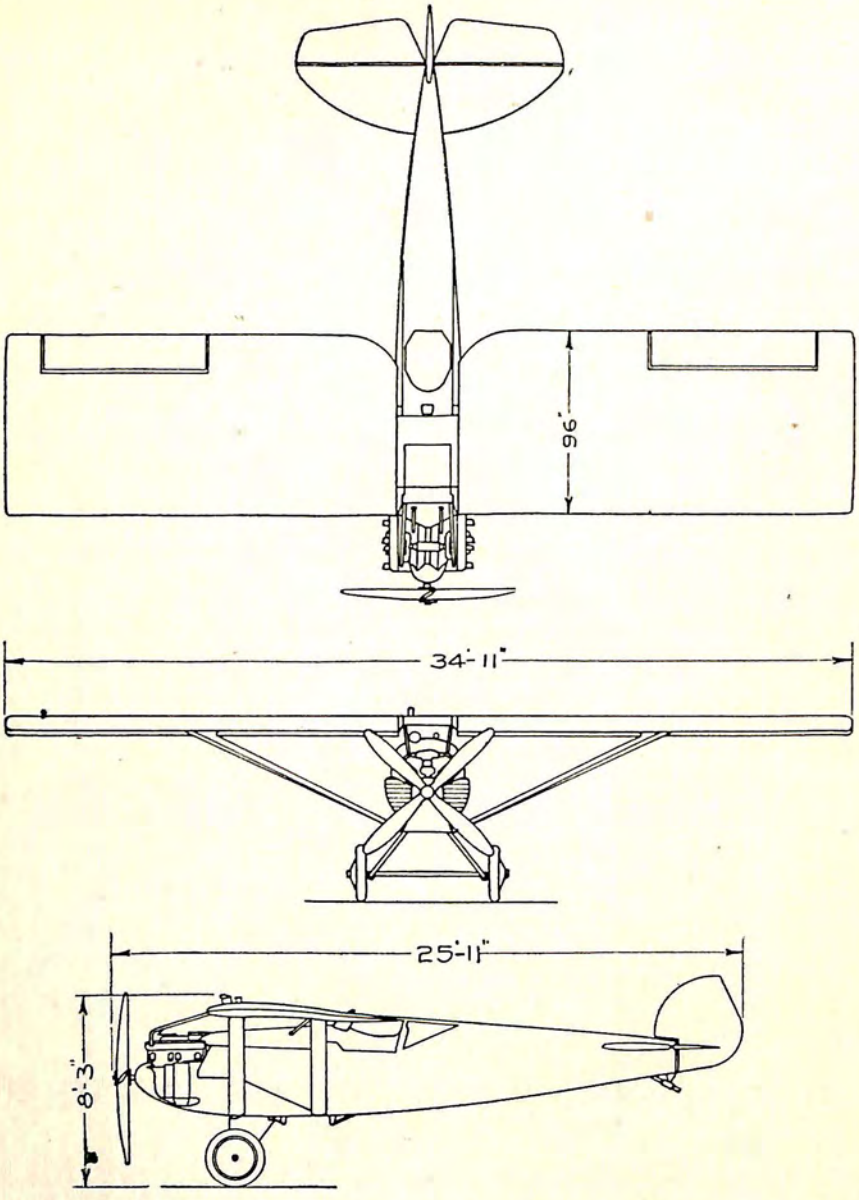


TYPE HO AND HN AIRPLANE

DESIGNED AND CONSTRUCTED FOR THE BUREAU OF AERONAUTICS BY

THE HUFF DALAND COMPANY

OGDENSBURG, N.Y.

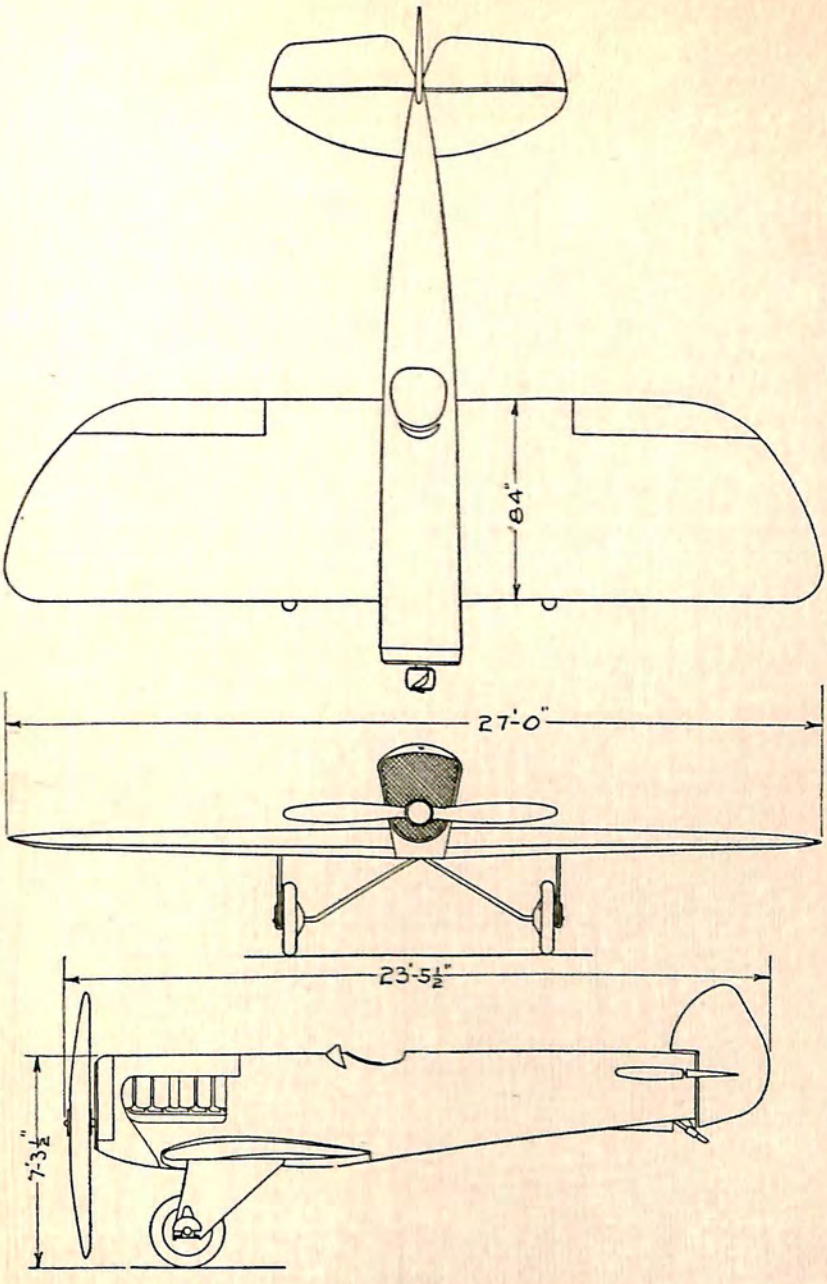


LOENING AERONAUTICAL ENGINEERING CORPORATION

NEW YORK, N.Y.

TYPE. LOENING PURSUIT PW2A MODEL. 24

ENGINE. WRIGHT-8 300 H.P. SPEED 140 M.P.H CLIMB: 10,000 FT IN 9 MIN

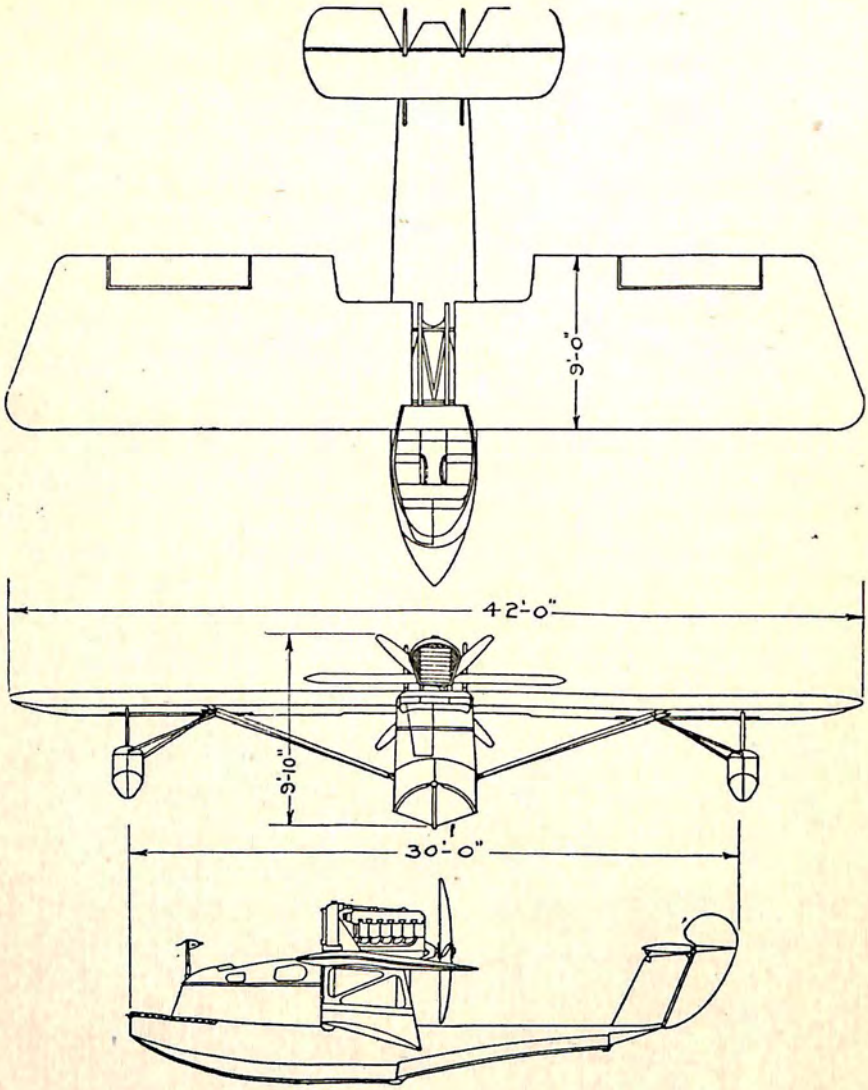


LOENING AERONAUTICAL ENGINEERING CORPORATION

NEW YORK, N.Y.

TYPE: LOENING RACER R-4 MODEL. 29

ENGINE: PACKARD-12 600 H.P. SPEED. 190 M.P.H. CLIMB: 10,000 FT. IN 5 MIN.

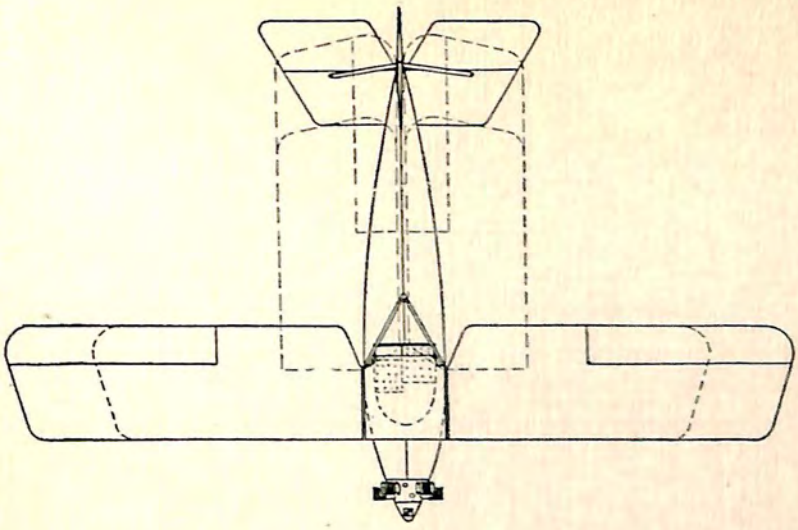


LOENING AERONAUTICAL ENGINEERING CORPORATION

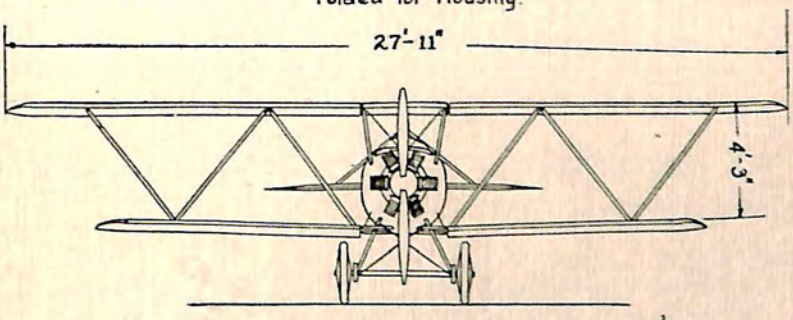
NEW YORK, N.Y.

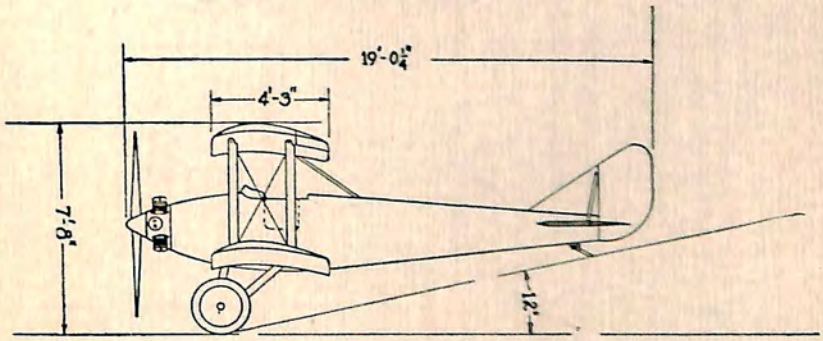
TYPE: LOENING AIR YACHT — 1923 MODEL

ENGINE: LIBERTY-12 400 H.P. — SPEED 130 M.P.H.



NOTE.
Dotted-Lines Show Position of Wings when Folded for Housing.



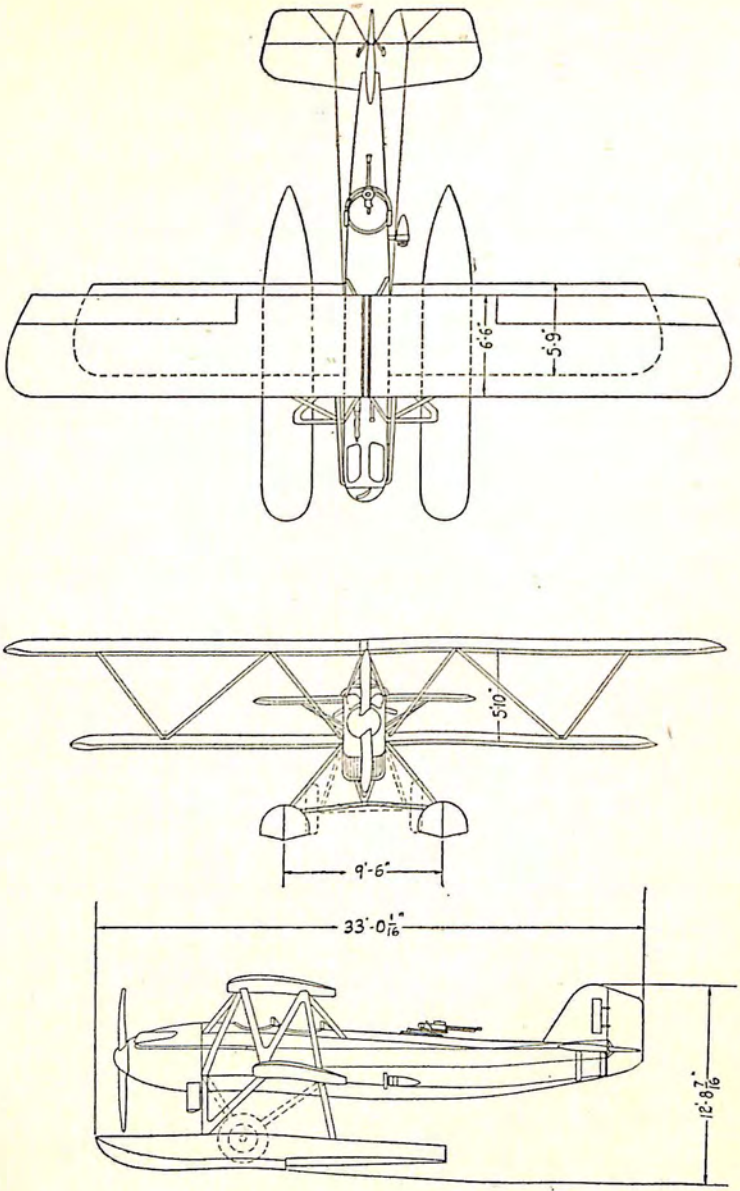


THE LONGREN AIRCRAFT CORPORATION.

TOPEKA, KANSAS:

TYPE: COMMERCIAL 2 SEATER MODEL: "THE NEW LONGREN."

MOTOR: RADIAL, 6 CYL., ANZANI, 70-80 H.P. SPEED: 32-107 M.P.H. CLIMB: FIRST 1000 FT. IN 30 SEC.

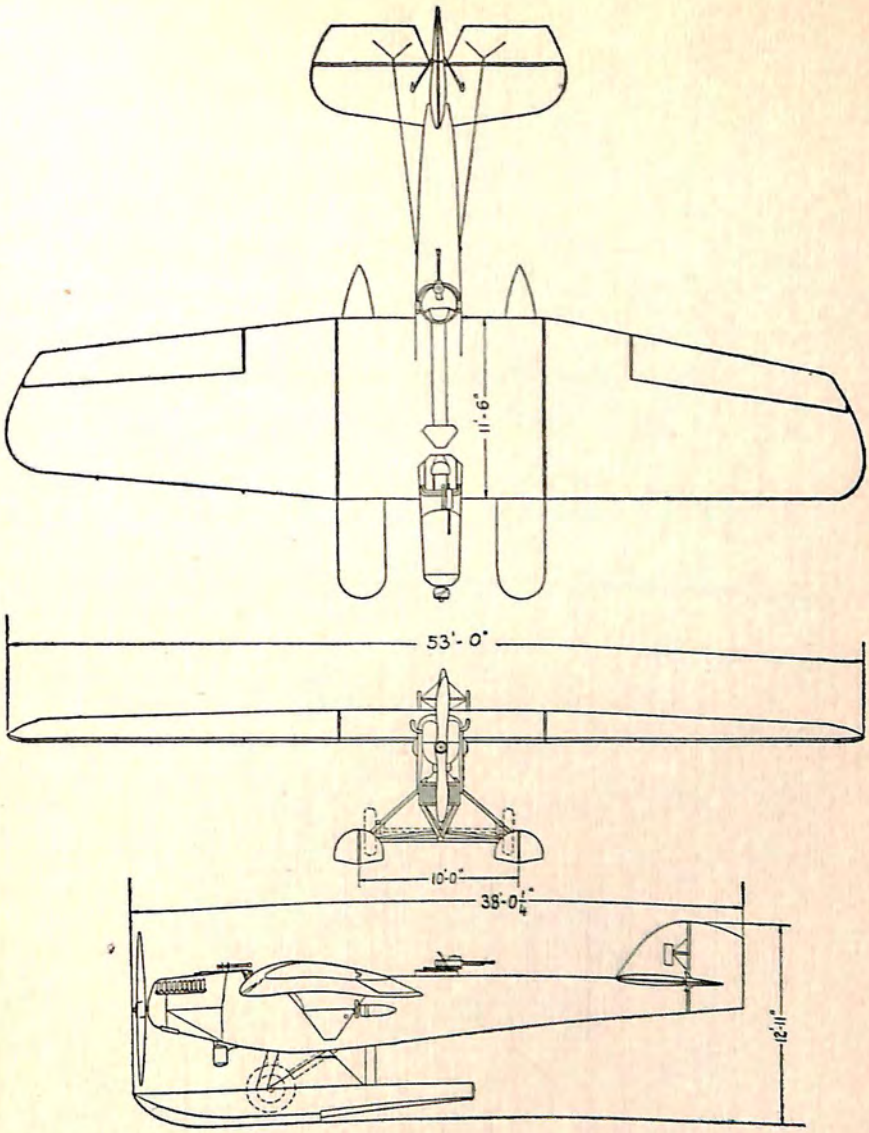


THE GLENN L. MARTIN COMPANY

CLEVELAND, OHIO.

TYPE: NAVY SPOTTER MODEL M20-1:

ENGINE: CURTISS D-12 350 H.P.

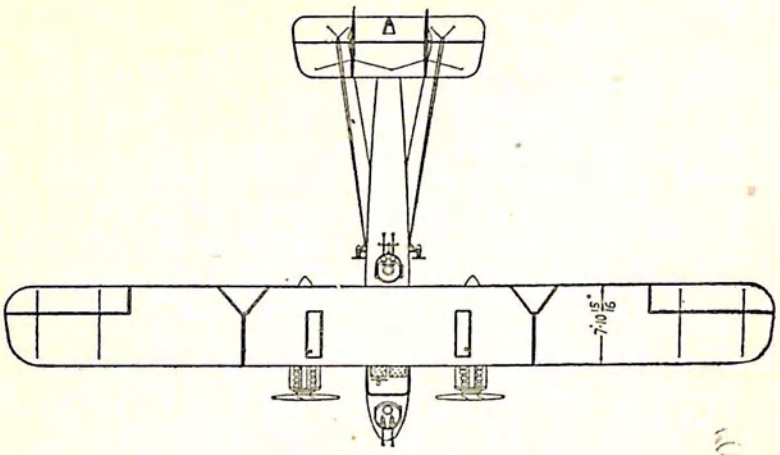


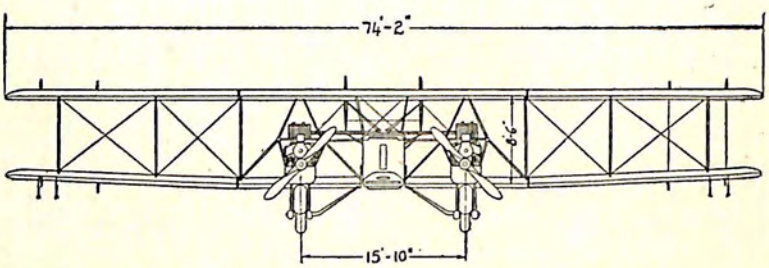
THE GLENN L. MARTIN COMPANY

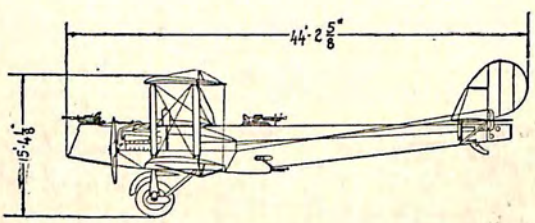
CLEVELAND, OHIO

TYPE: NAVY SPOTTER MODEL M0-1

ENGINE: CURTISS D-12 350 H.P.







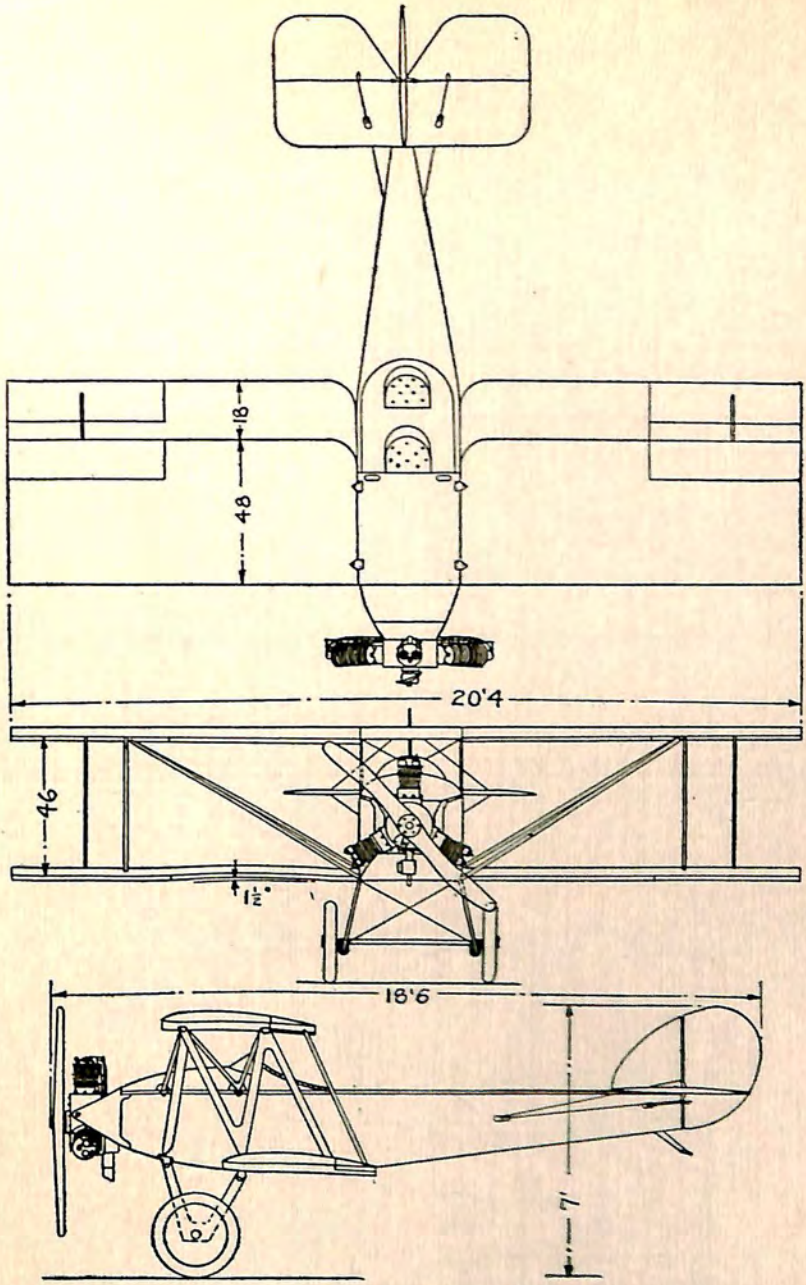
THE GLENN L. MARTIN COMPANY

CLEVELAND, OHIO.

TYPE: SHORT DISTANCE BOMBER MODEL: MB-2

ENGINES: LIBERTY-12- 420 H.P. EACH - CLIMB IN 10 MIN. 4,000 FT.

SPEED: 97.5 M.P.H.

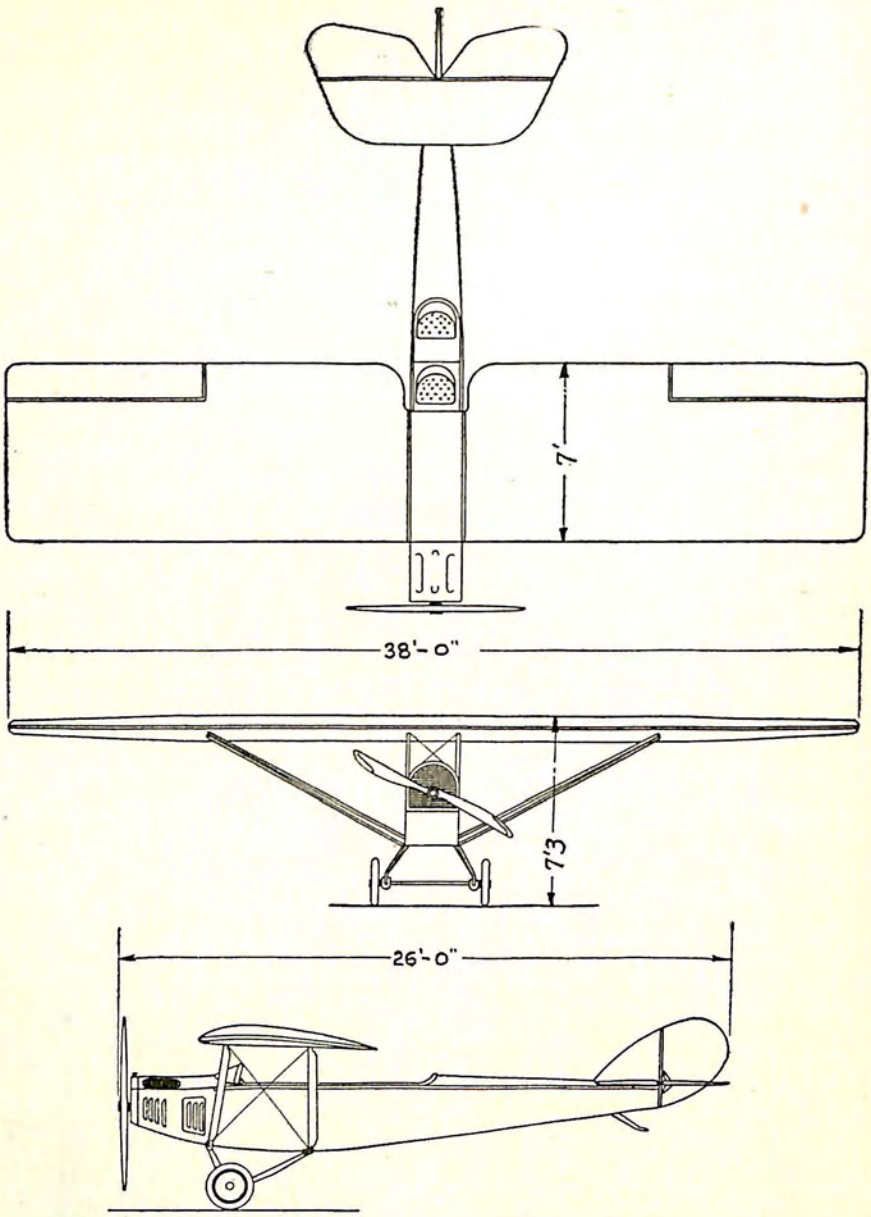


LAWRENCE SPERRY AIRCRAFT COMPANY, INC.

FARMINGDALE, L.I., N.Y.

TYPE: SPORT PLANE. 35-85 M.P.H. FUEL: 3½ HRS. RANGE 275 MILES.

ENGINE: WRIGHT L4. (LAWRANCE TYPE) - CLIMB 5000 FT. IN. 10 MIN.

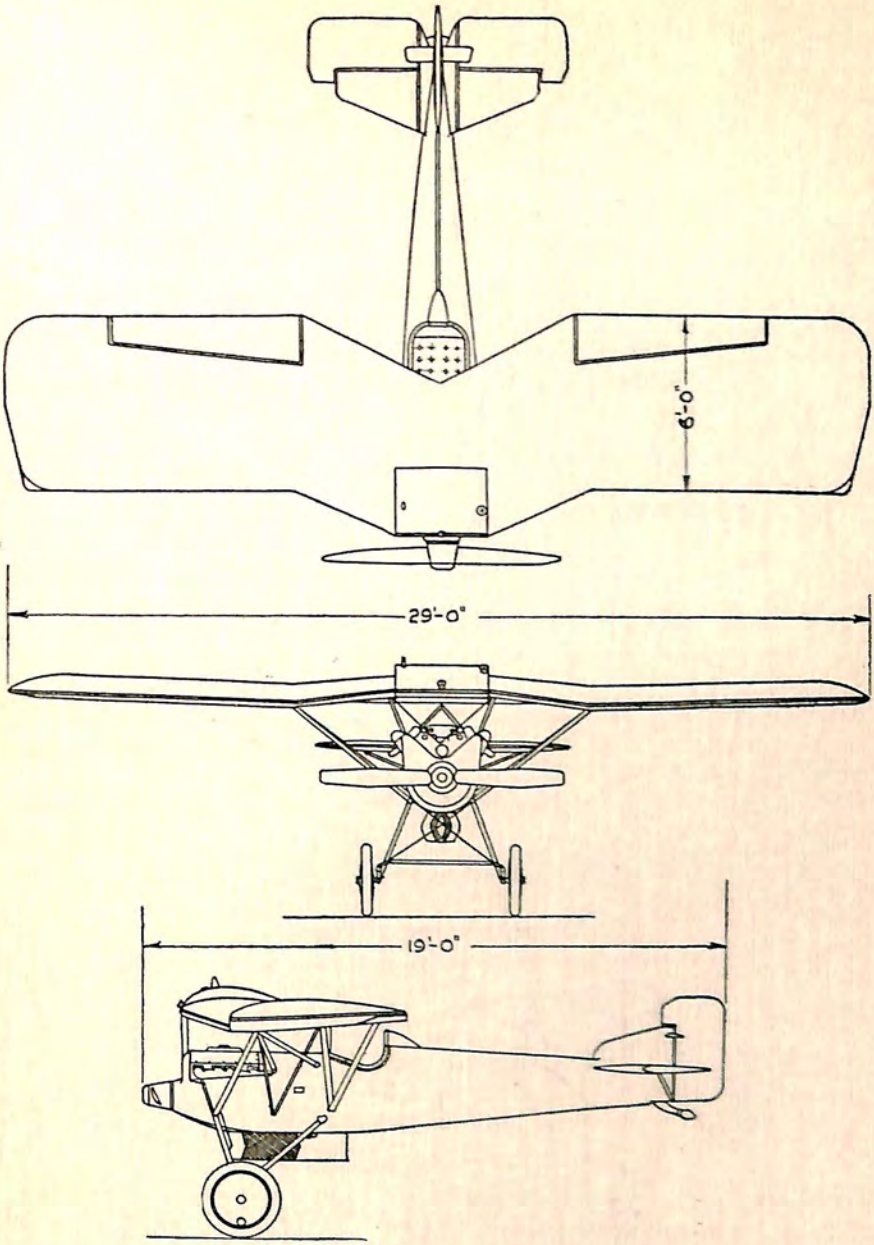


LAWRENCE SPERRY AIRCRAFT COMPANY INC.

FARMINGDALE, L.I., N.Y.

TYPE: 3 PASSENGERS & PILOT. CURTISS JN WITH SPERRY MONOPLANE WING.

ENGINE: OX 90 H.P. OR OXX 110 H.P. SPEED: 35-80 OR 37-85 M.P.H. CLIMB: 3000 FT. 10 MIN.

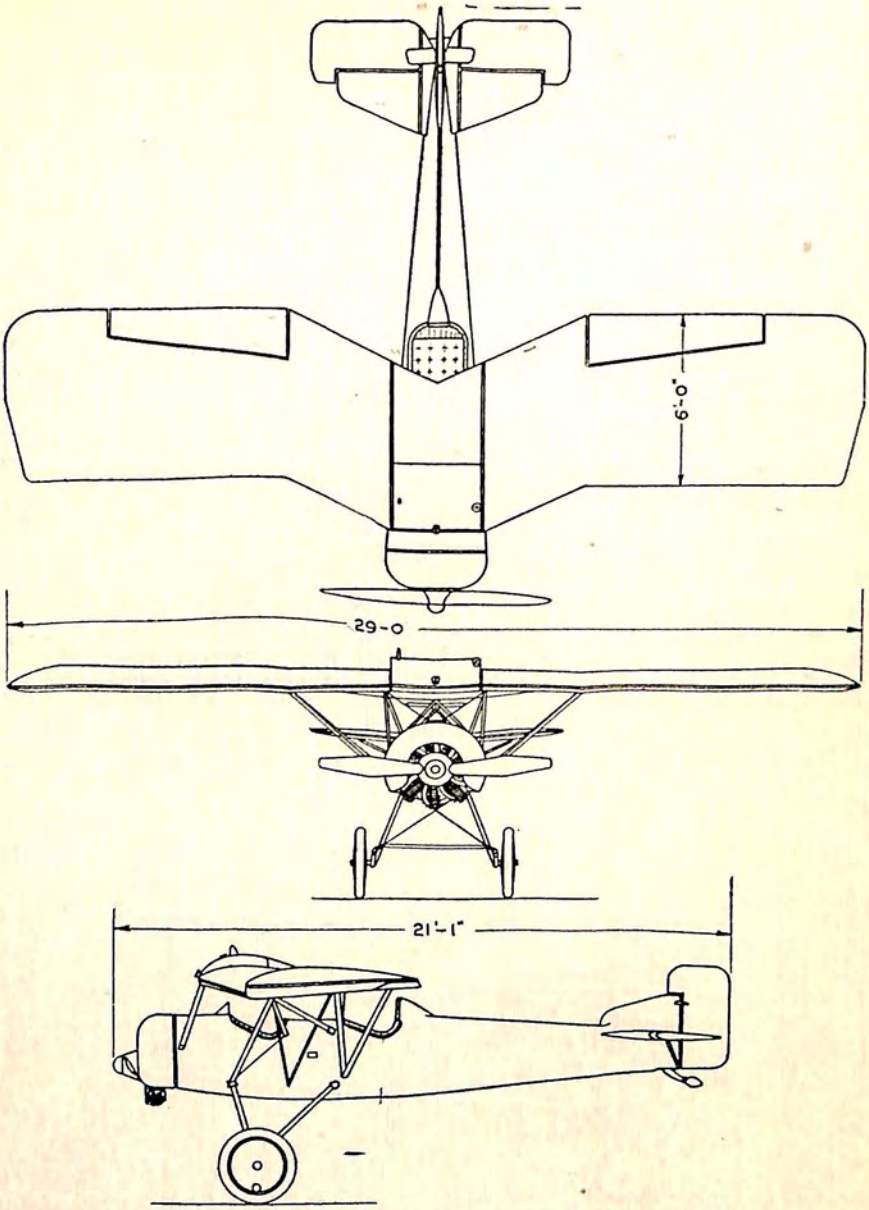


THOMAS MORSE AIRCRAFT CORPORATION

ITHACA, N.Y.

TYPE: PURSUIT MODEL: MB-9 ALL METAL

ENGINE: 300 H.P. WRIGHT SPEED: 65 - 170 M.P.H.

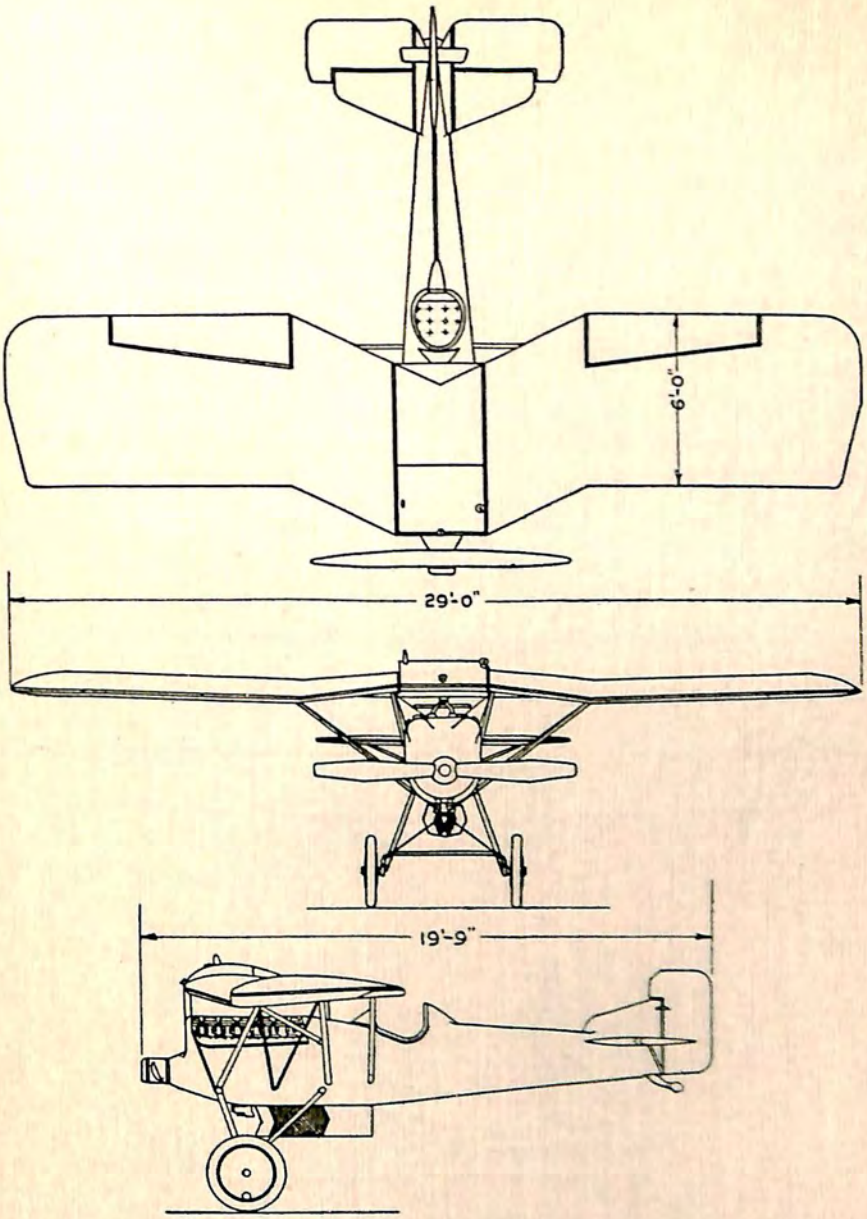


THOMAS MORSE AIRCRAFT CORPORATION

ITHACA, N Y

TYPE: TRAINING MODEL. MB-10 ALL METAL

ENGINE · 110 H.P LE RHONE SPEED: 50-105 M.P.H. CLIMB: 5000 FT. IN 10 MIN

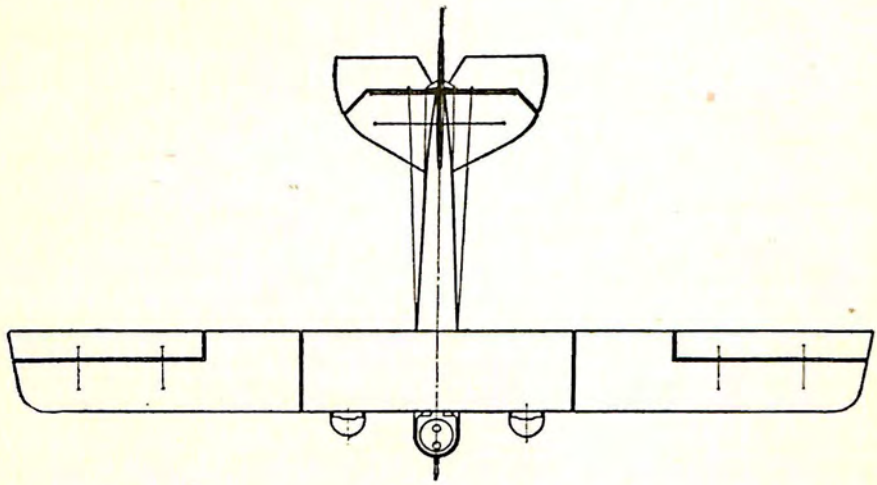


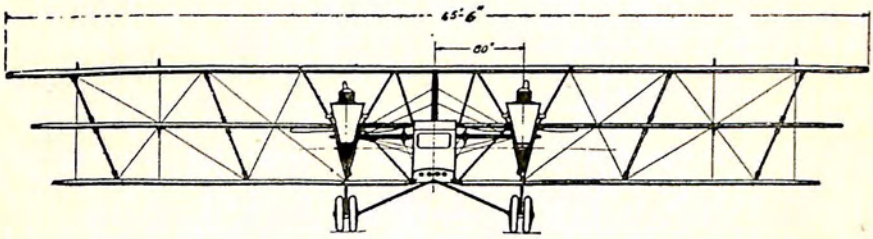
THOMAS MORSE AIRCRAFT CORPORATION

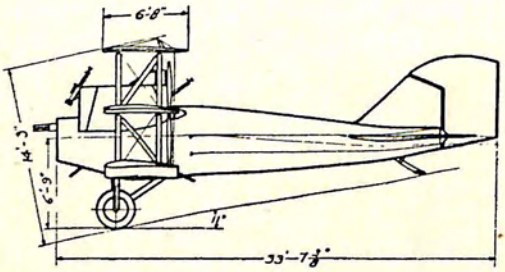
ITHACA, N.Y

TYPE: PURSUIT MODEL: TM-22 ALL METAL

ENGINE 600 H.P PACKARD SPEED 188 M.P.H

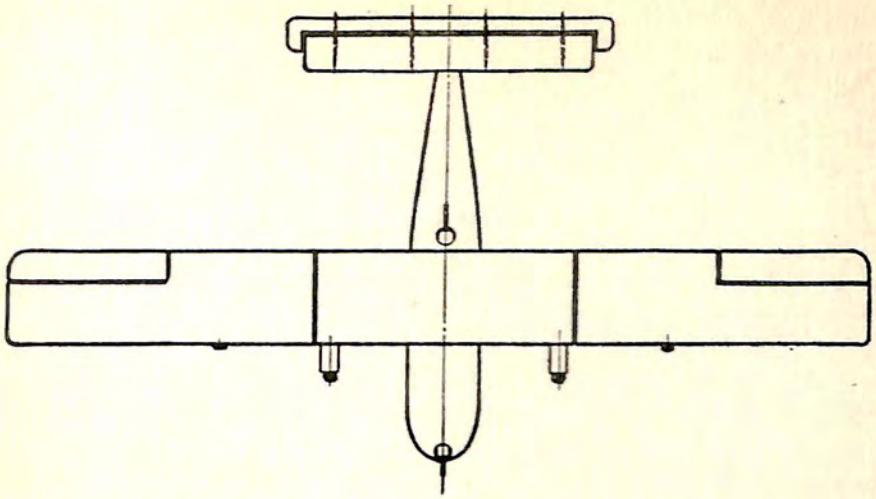


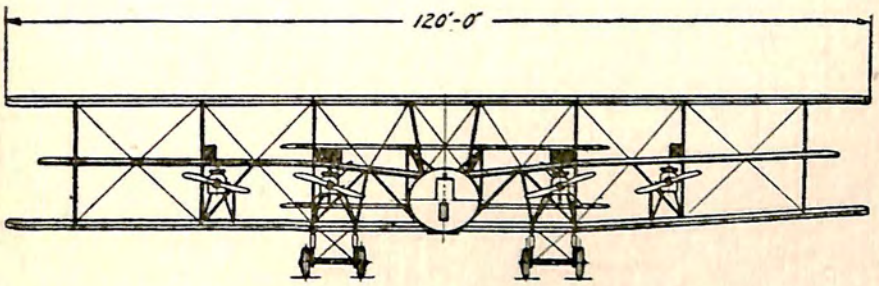


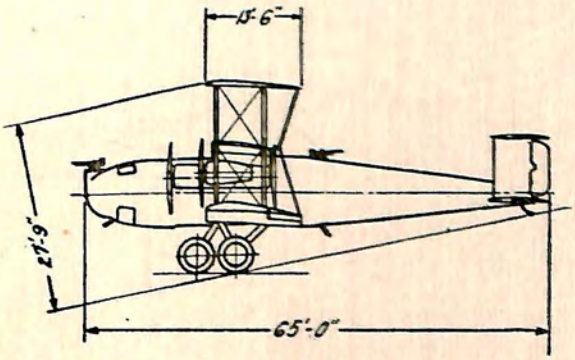


U.S. AIR SERVICE ENGINEERING DIVISION
DAYTON, OHIO

TYPE: VI GROUND ATTACK MODEL G.A.I
ENGINES 2-400 H.P. LIBERTY SPEED: 100 M.P.H. CLIMB: 495 FT. PER MIN.





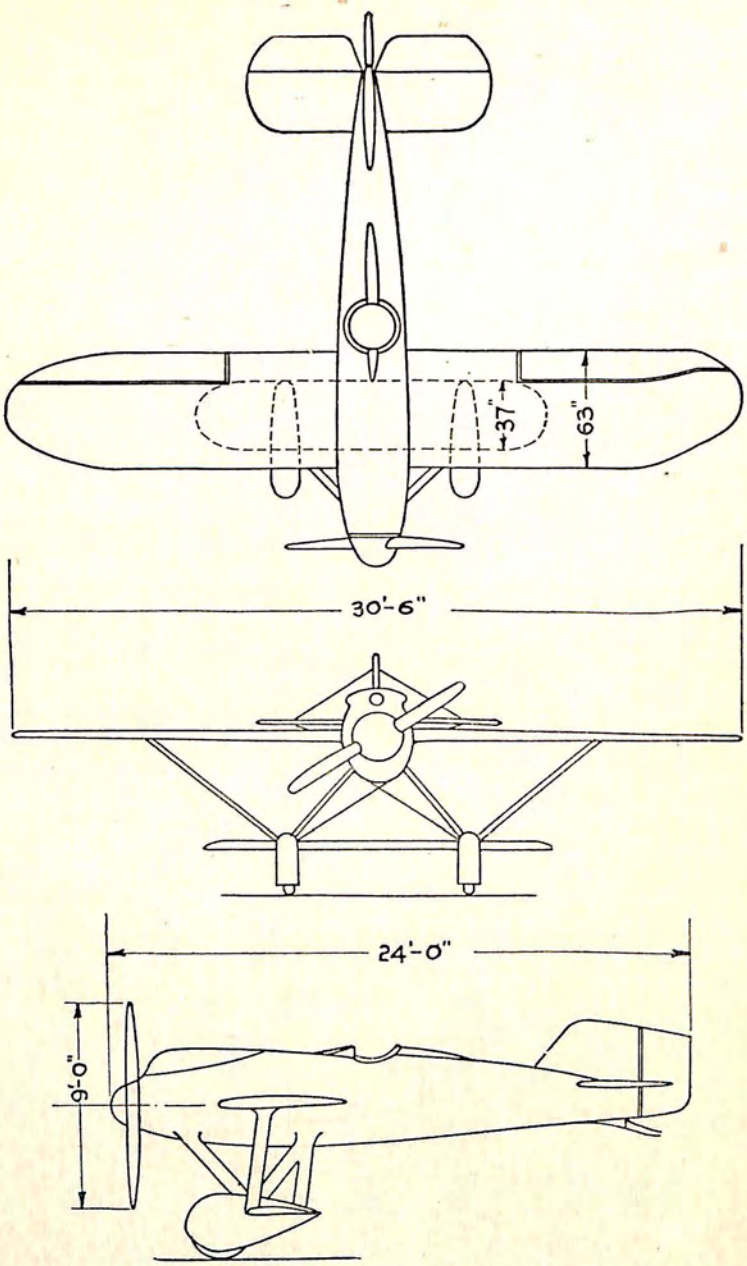


U.S. AIR SERVICE ENGINEERING DIVISION

DAYTON, OHIO

TYPE XIII BOMBARDMENT MODEL NBL1 (BARLING BOMBER)

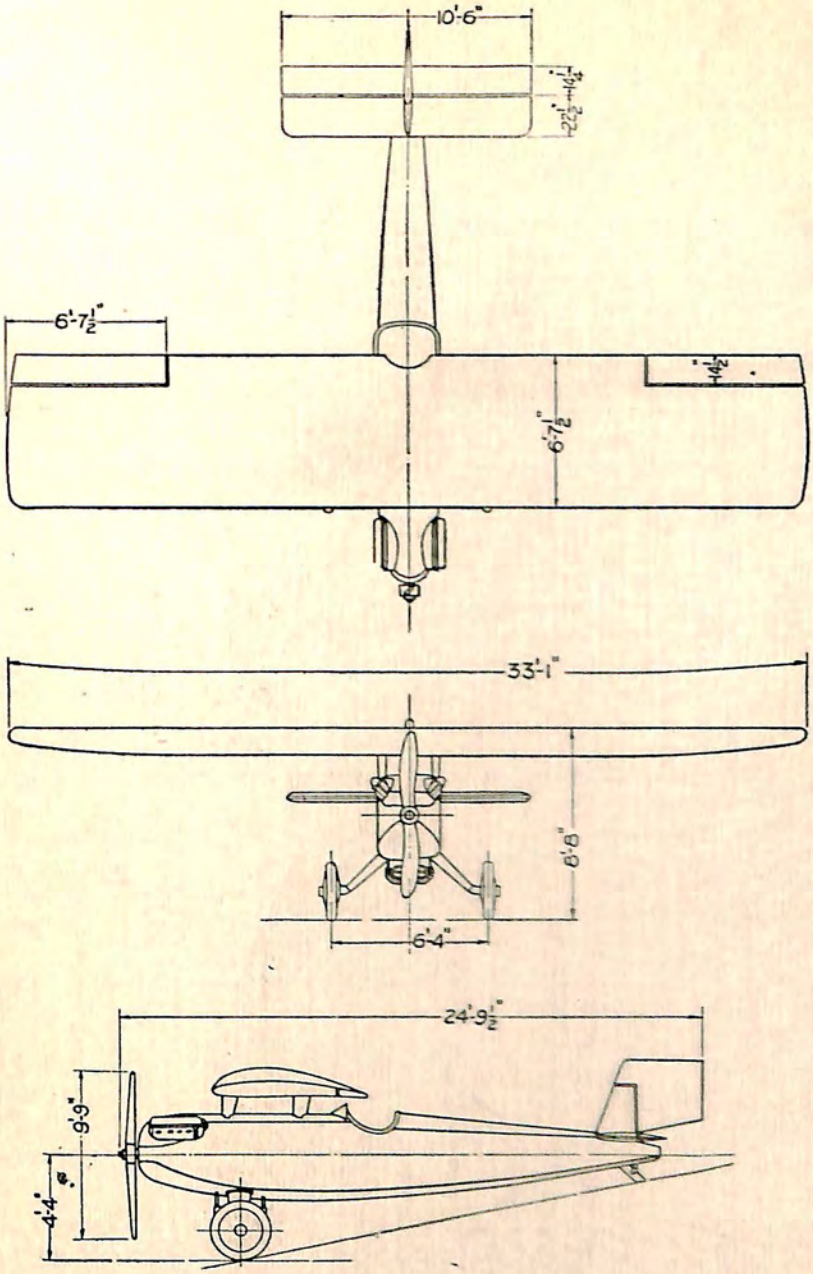
ENGINES. 6-400 H.P LIBERTY SPEED: 100 M.P.H. CLIMB. 7000 FT IN 20 MIN.



WRIGHT AERONAUTICAL CORPORATION

PATERSON, N.J.

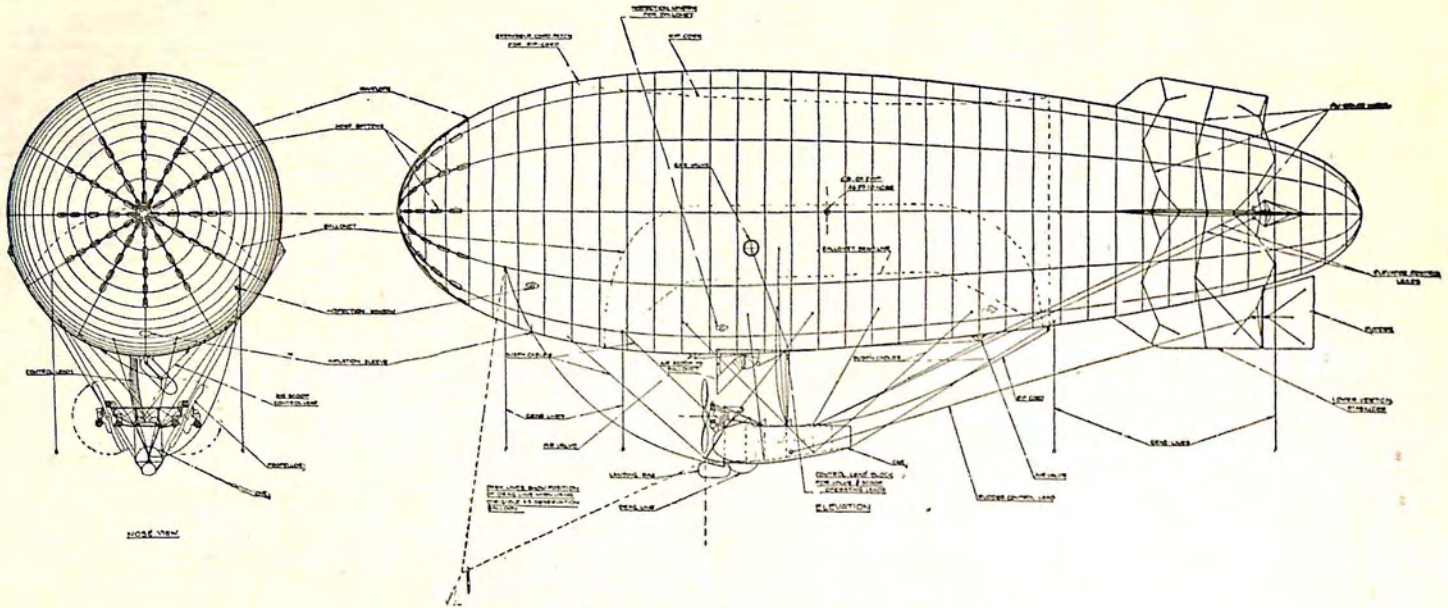
NAVY WRIGHT SESQUIPLANE - WRIGHT T-2 ENGINE



WRIGHT AERONAUTICAL CORPORATION
PATERSON, N.J.

WRIGHT ALL METAL PURSUIT PLANE - TYPE 1

247

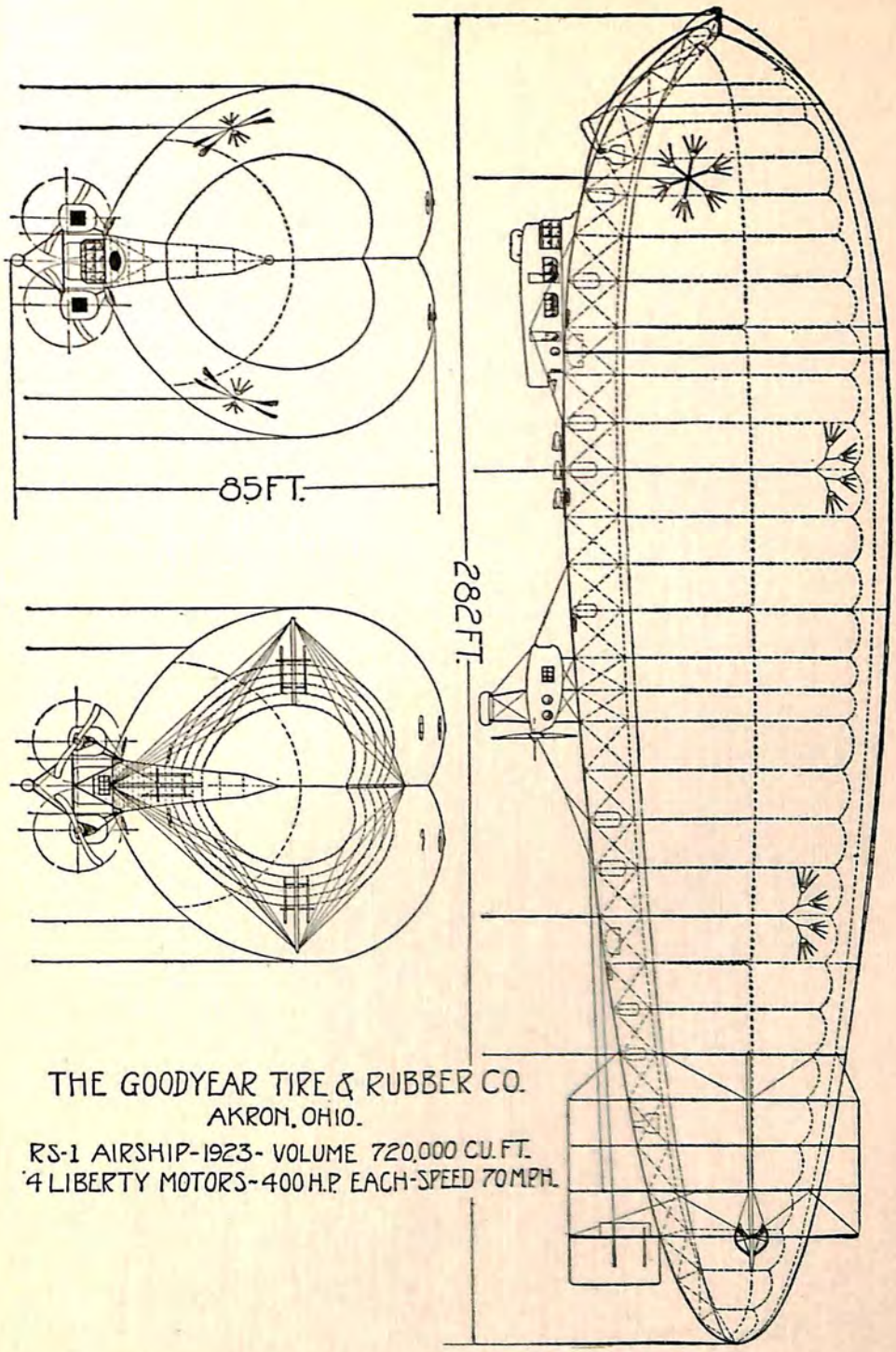


AIRSHIPS INCORPORATED

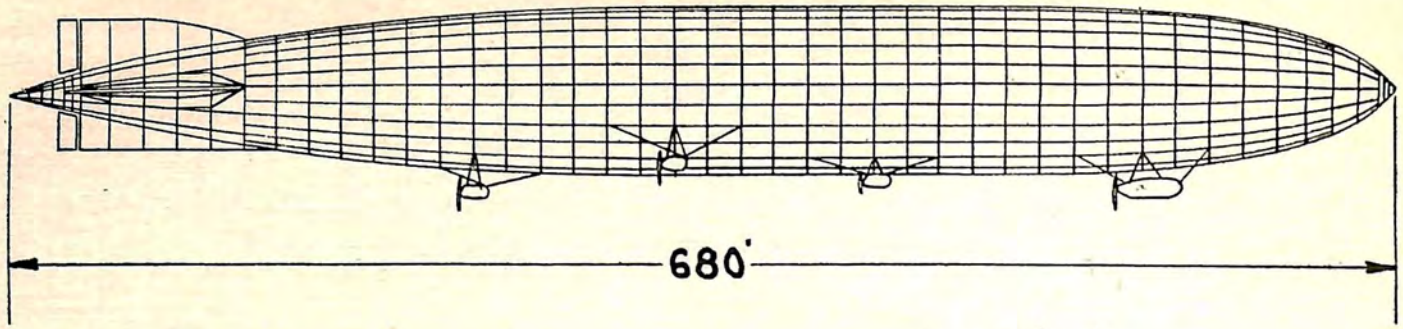
HAMMONDSPORT, N.Y.

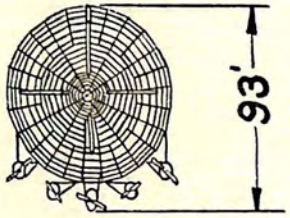
TOWING AIRSHIP TYPE: USMB

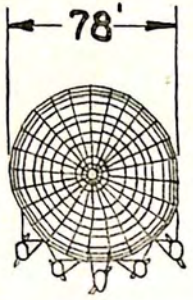
ENGINES: 2 WRIGHT (LAWRANCE TYPE).



THE GOODYEAR TIRE & RUBBER CO.
AKRON. OHIO.
RS-1 AIRSHIP-1923- VOLUME 720,000 CU. FT.
4 LIBERTY MOTORS-400 H.P. EACH-SPEED 70 M.P.H.

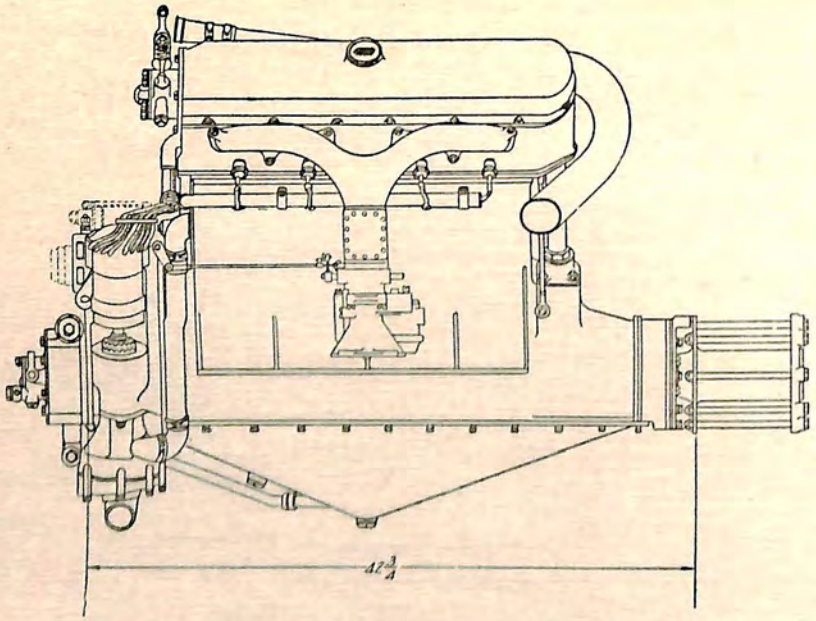


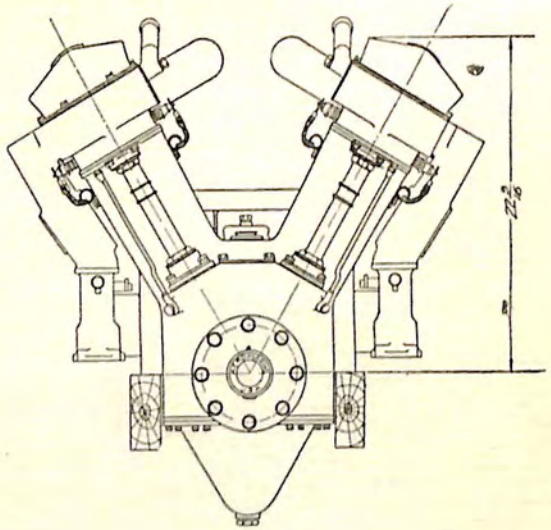




NAVY RIGID AIRSHIP ZR-1

DESIGNED BY THE BUREAU OF AERONAUTICS AND
CONSTRUCTED BY THE NAVAL AIRCRAFT FACTORY

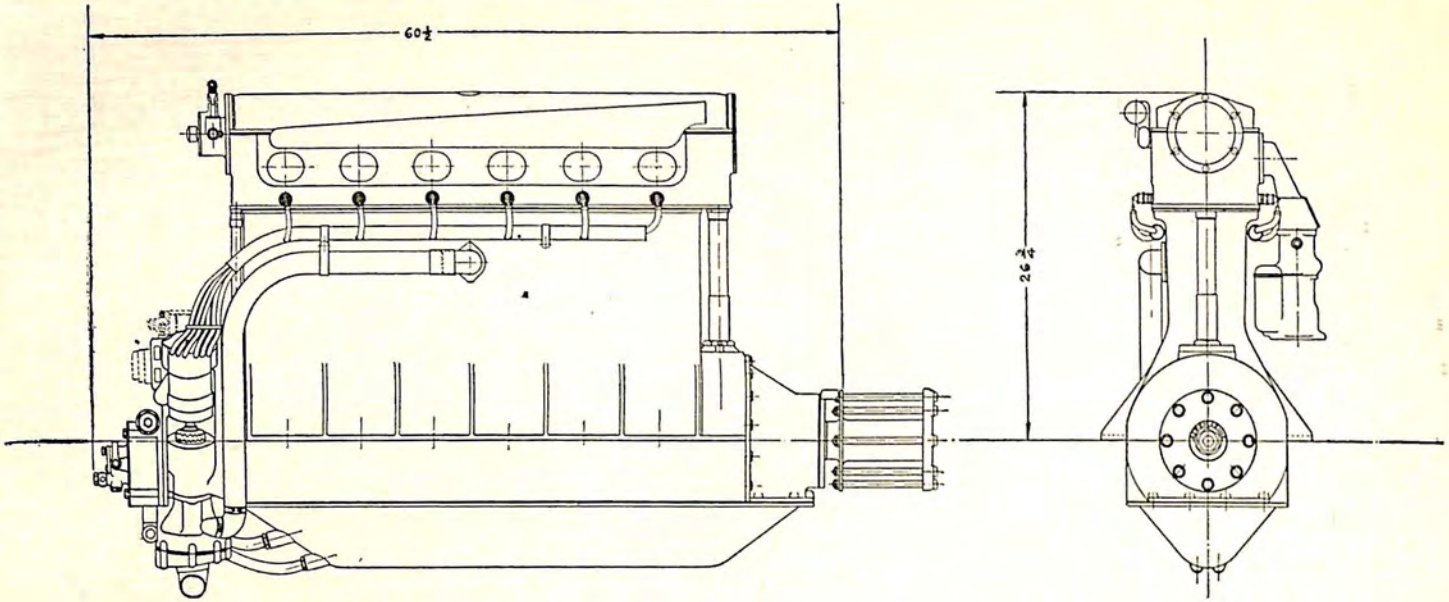




AEROMARINE PLANE & MOTOR COMPANY ~ KEYPORT, N.J.

MODEL: U-873 | 8 CYLINDERS | WATER COOLED

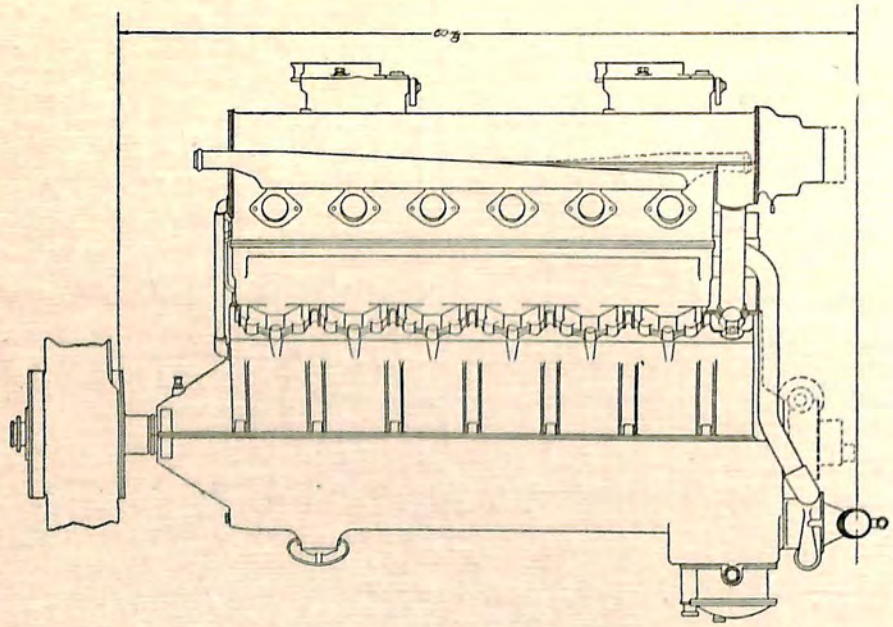
250 B.H.P. AT 1800 R.P.M. | 525. LBS. DRY | 37. LBS. WATER

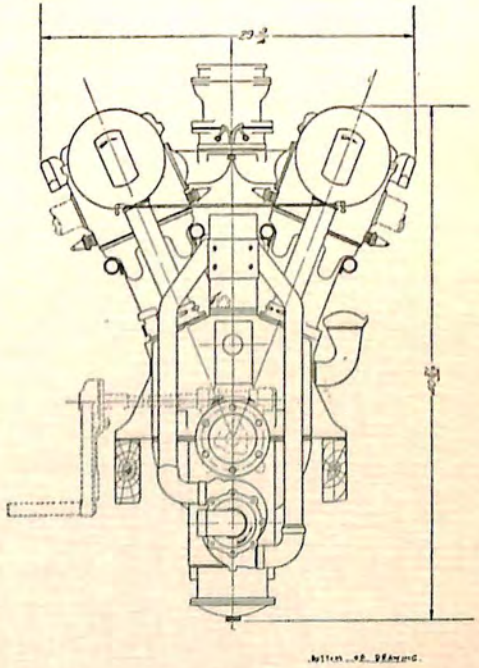


AEROMARINE PLANE & MOTOR COMPANY ~ KEYPORT, N.J.

MODEL: T-6 | 6 CYLINDERS | WATER COOLED

200 B.H.P. AT 1700 R.P.M. | 569. LBS. DRY | 41. LBS. WATER

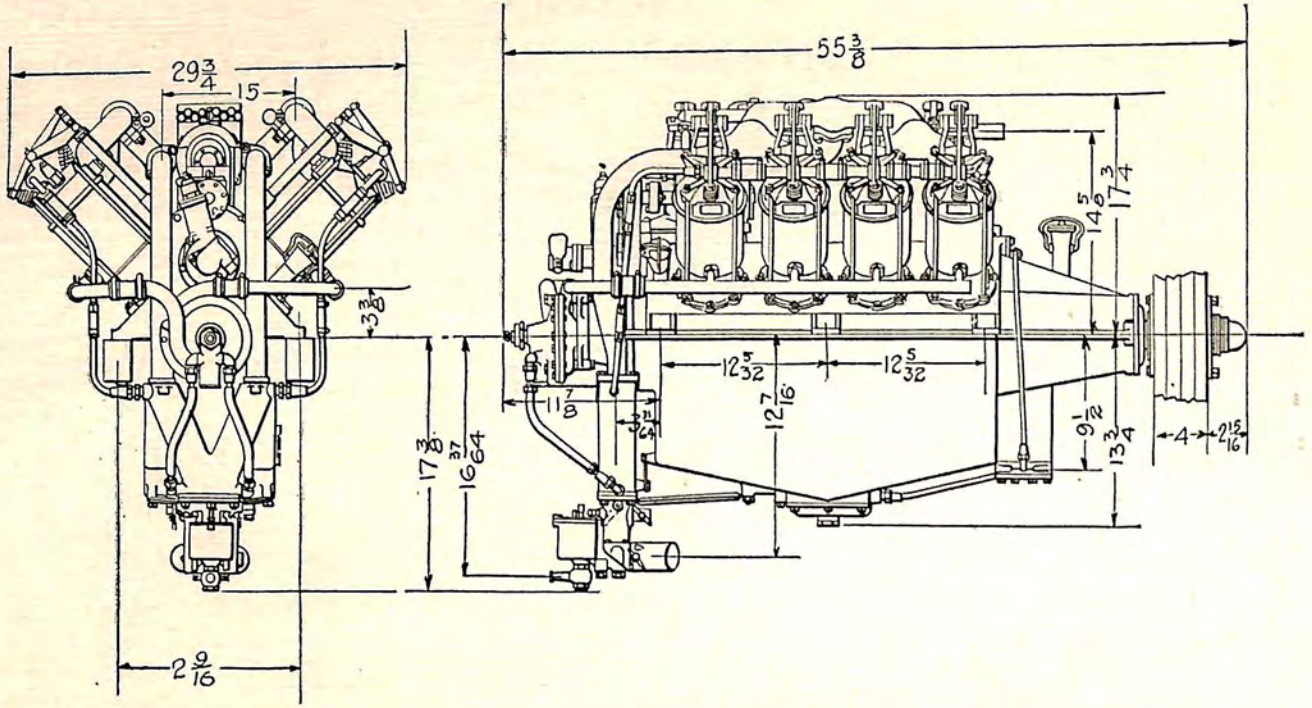




AEROMARINE PLANE & MOTOR COMPANY ~ KEYPORT. N.J.

MODEL: NAL 12 CYLINDERS WATER COOLED

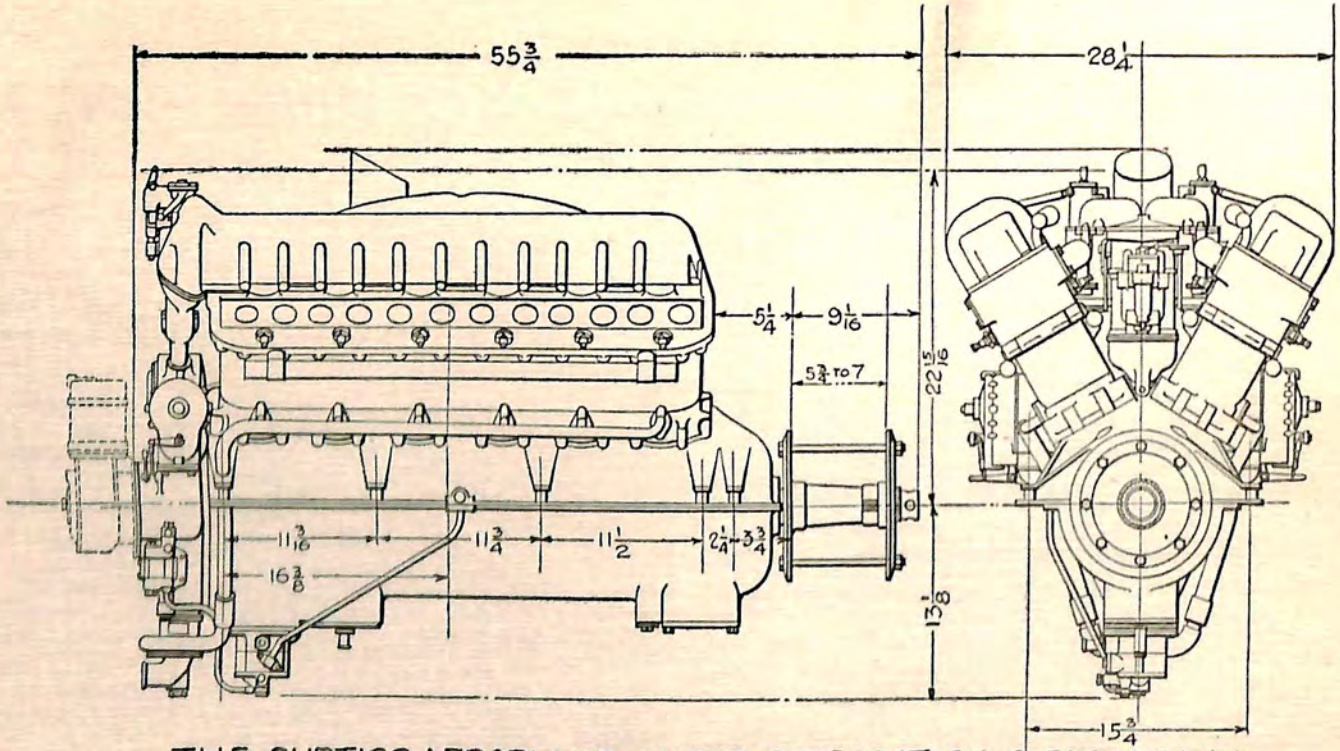
450 B.H.P. AT 1800 R.P.M. 919 LBS. DRY 61. LBS. WATER



THE CURTISS AEROPLANE & MOTOR CORPORATION - GARDEN CITY, N.Y.

MODEL OX-5-A 8 CYLINDERS WATER COOLED

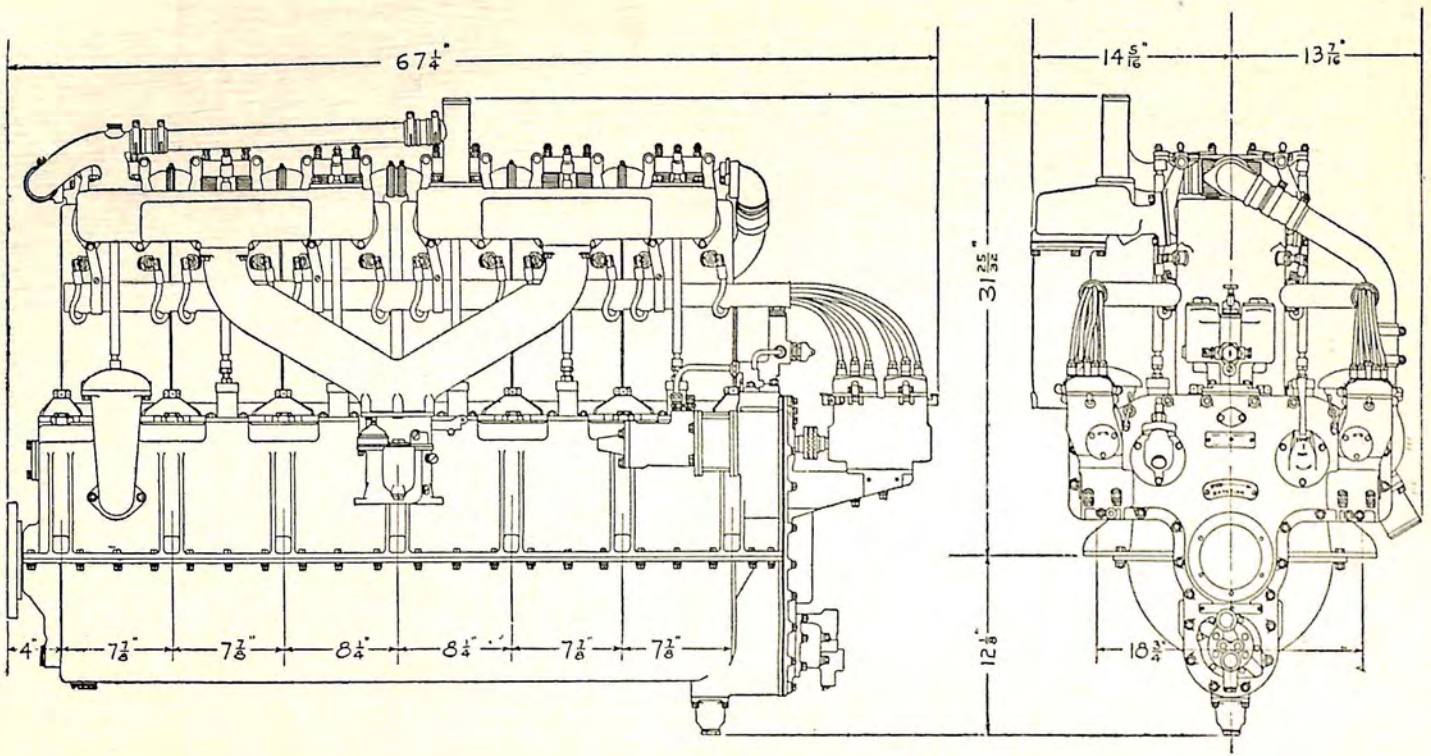
112 B.H.P. AT 1800 R.P.M. 390 LBS. DRY 11 LBS. WATER



THE CURTISS AEROPLANE & MOTOR CORPORATION - GARDEN CITY, N.Y.

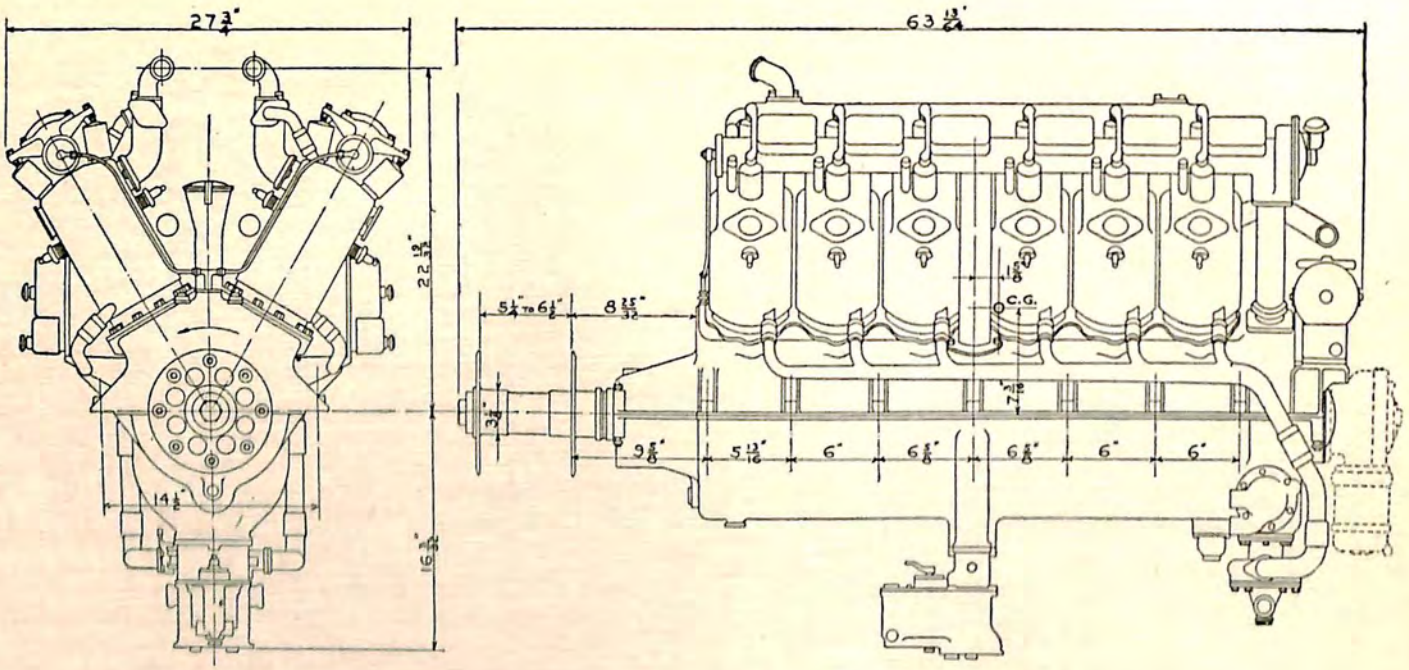
MODEL D-12 12 CYLINDERS WATER COOLED

400 B.H.P. AT 2000 R.P.M. 670 LBS. DRY 44 LBS. WATER



PACKARD MOTOR CAR COMPANY ~ DETROIT, MICH.

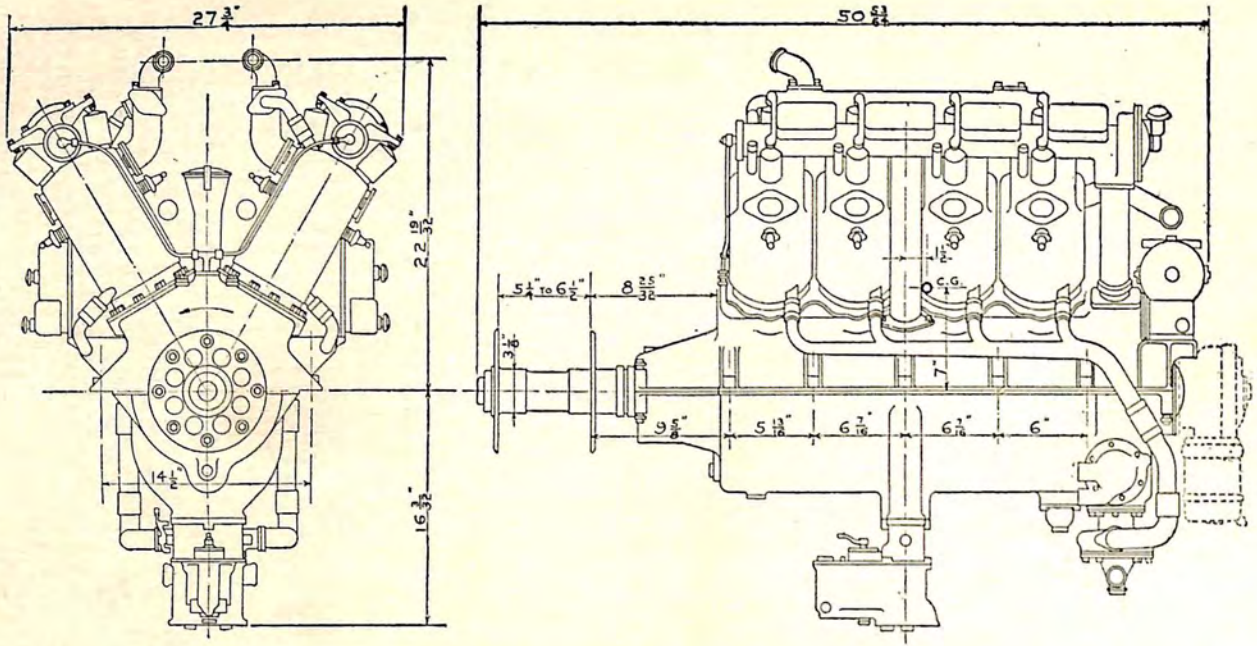
MODEL: 1-A-1551 6-CYLINDERS WATER COOLED



PACKARD MOTOR CAR COMPANY ~ DETROIT, MICH.

MODEL: 1-A-1237 12 CYLINDERS WATER COOLED

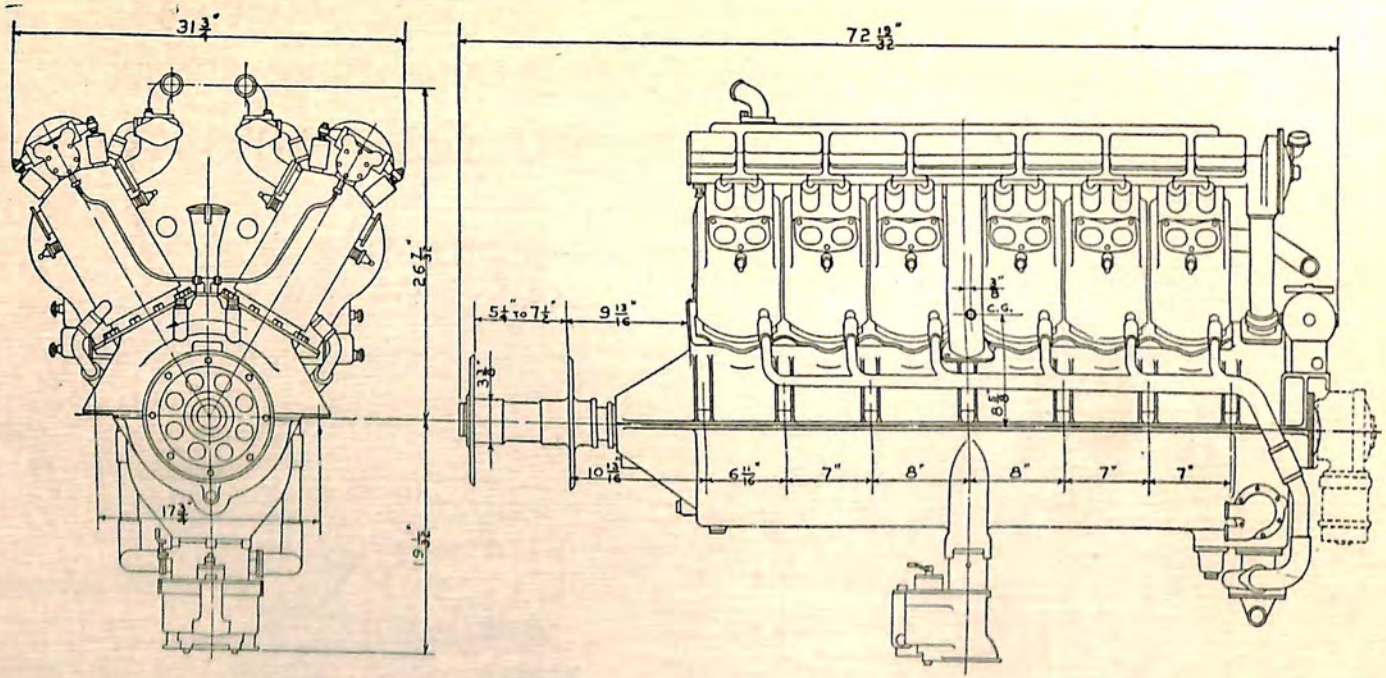
400 B.H.P. AT 2000 R.P.M. 740 LBS. DRY 39 LBS. WATER



PACKARD MOTOR CAR COMPANY ~ DETROIT, MICH.

MODEL: I-A-825 8 CYLINDERS WATER COOLED

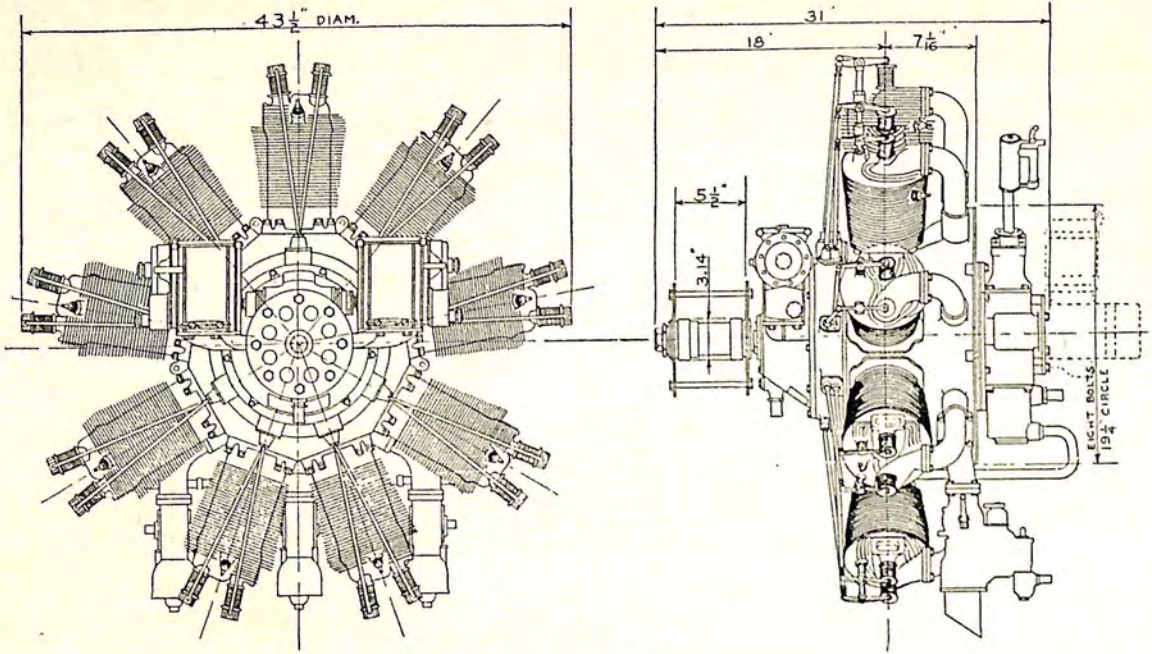
260 B.H.P. AT 2000 R.P.M. 550 LBS. DRY 23 LBS. WATER



PACKARD MOTOR CAR COMPANY ~ DETROIT, MICH.

MODEL: I-A-2025 12 CYLINDERS WATER COOLED

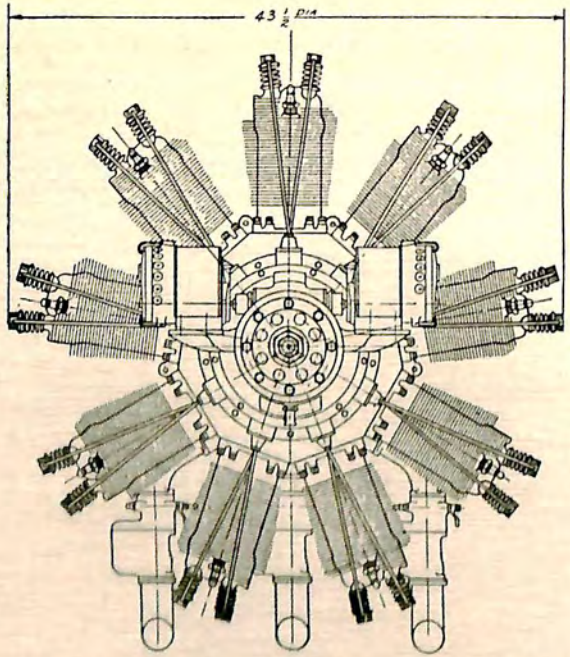
600 B.H.P. AT 2000 R.P.M. 1120 LBS. DRY 51 LBS. WATER

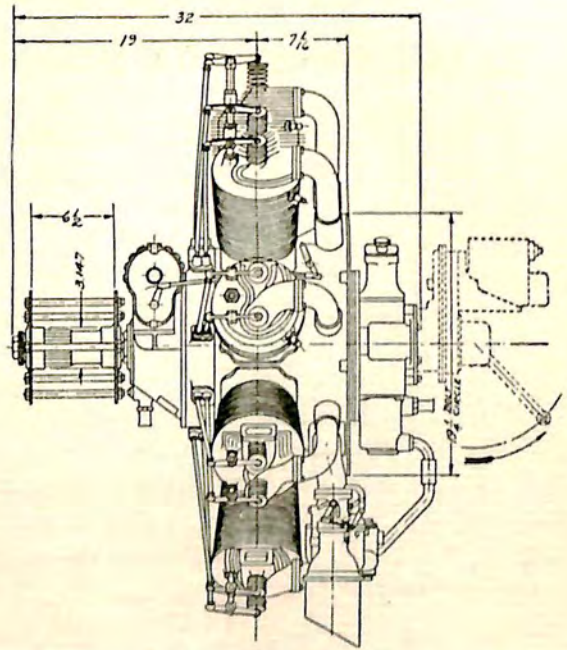


WRIGHT AERONAUTICAL CORPN - PATERSON, N.J.

MODEL: R.I. (LAWRANCE TYPE) 9 CYLINDERS-AIR COOLED.

160 B.H.P. AT 1600 R.P.M. 400 LBS COMPLETE.

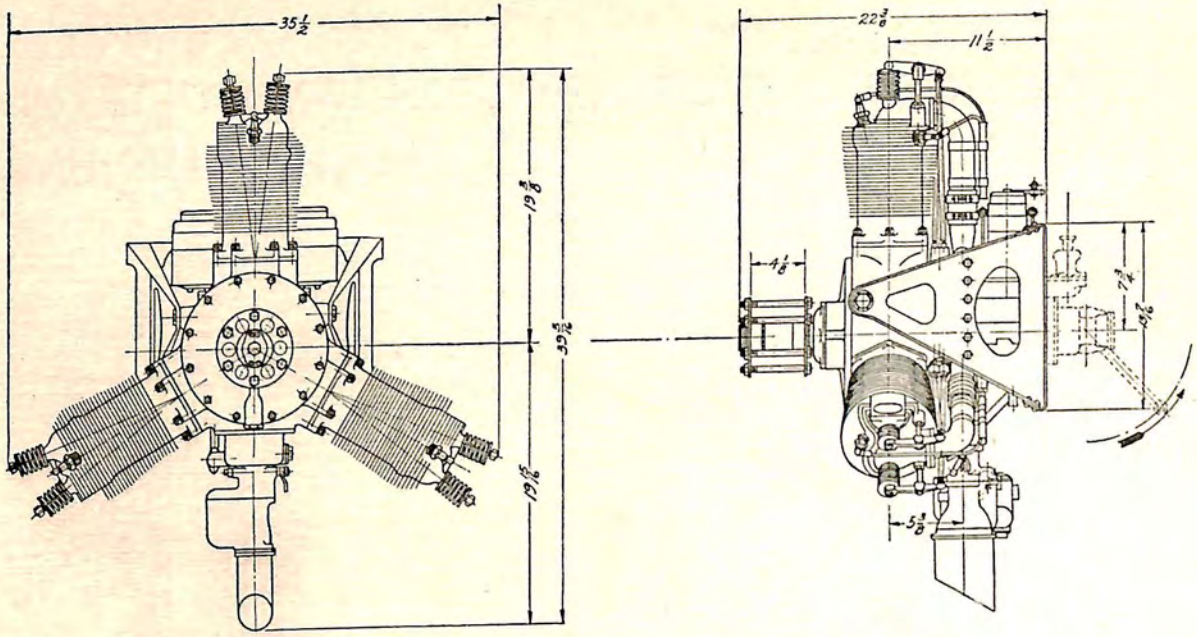




WRIGHT AERONAUTICAL CORPN - PATERSON, N.J.

MODEL: J.I. (LAWRANCE TYPE). 9 CYLINDERS-AIR COOLED.

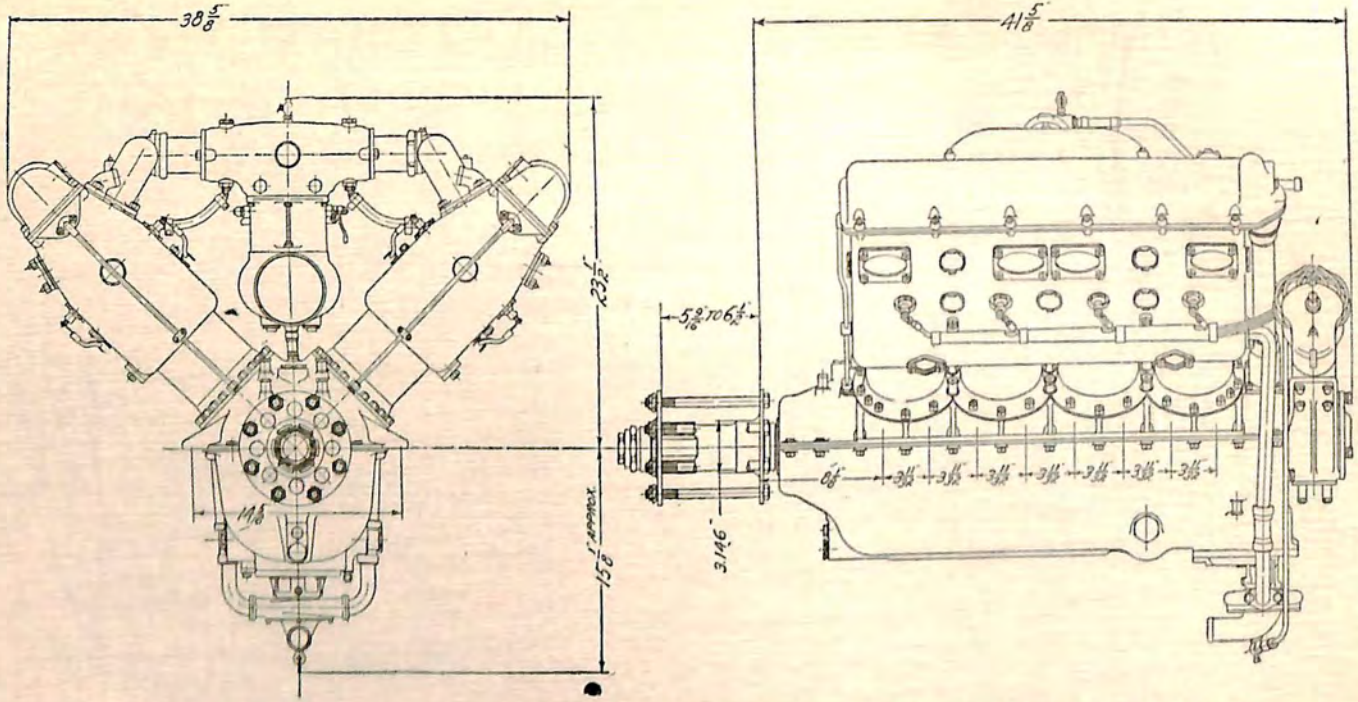
220 B.H.P. AT 1800 R.P.M. 442 LBS COMPLETE.



WRIGHT AERONAUTICAL CORP. PATERSON, N.J.

MODEL L.4(LAWRANCE TYPE) 3 CYLINDERS AIR COOLED.

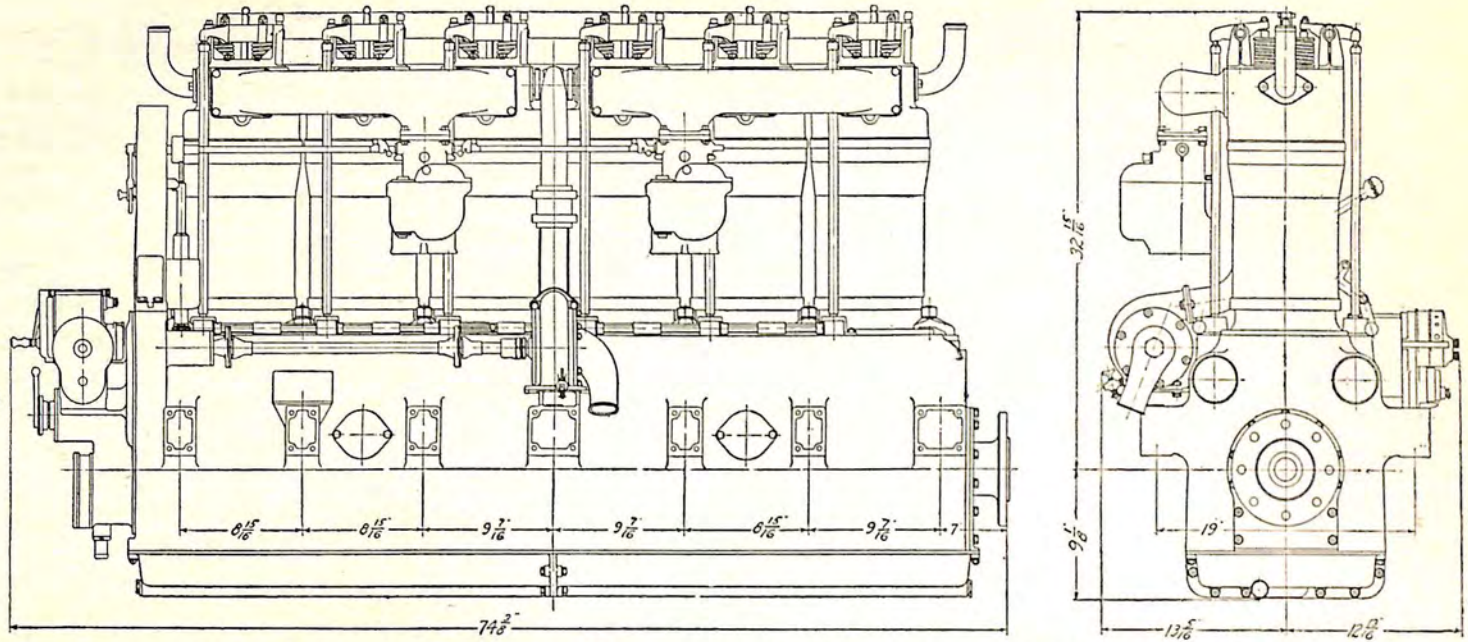
65 B.H.P. AT 1800 R.P.M. 175 LBS COMPLETE.



WRIGHT AERONAUTICAL CORPORATION – PATERSON, N.J.

MODEL - TYPE 4 8 CYLINDERS WATER COOLED

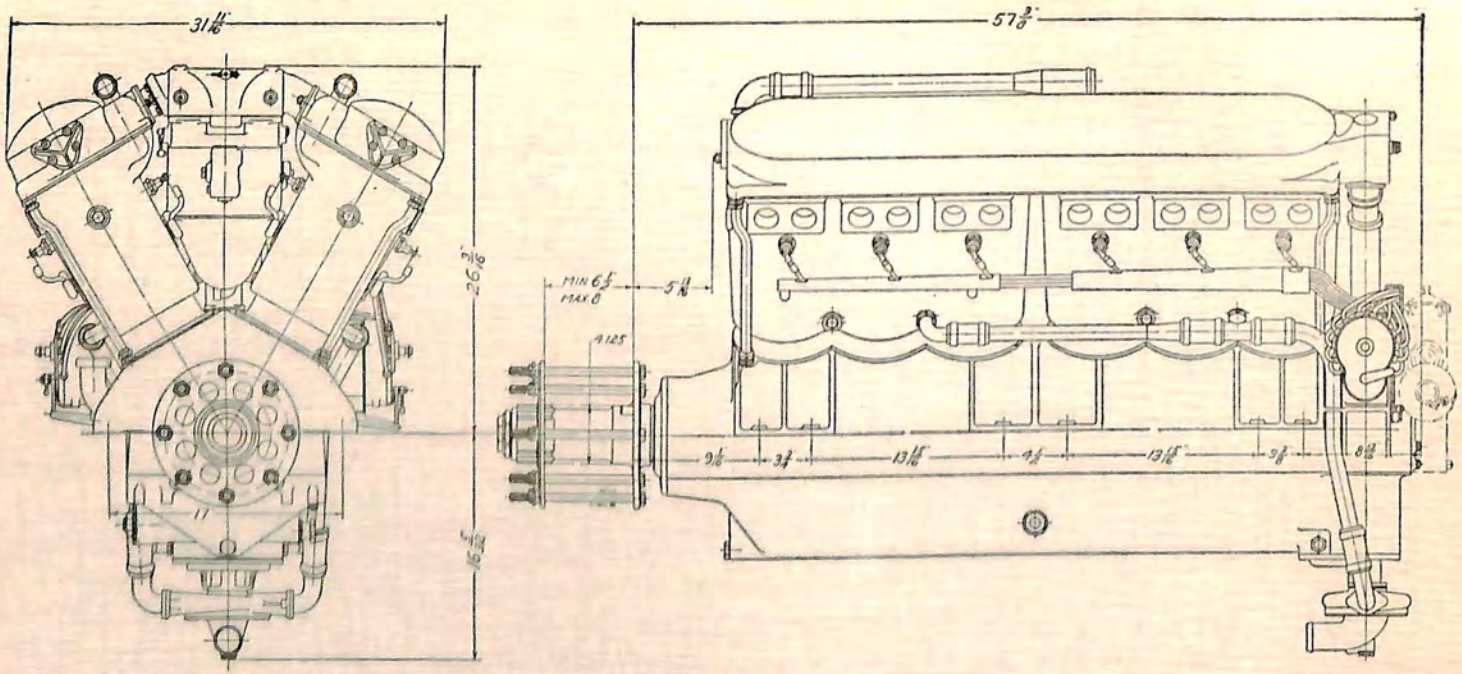
STANDARD - 400 B.H.P. AT 2000 R.P.M. 610 LBS. DRY



WRIGHT AERONAUTICAL CORPORATION – PATERSON. N.J.

MODEL - D1 6 CYLINDERS WATER COOLED

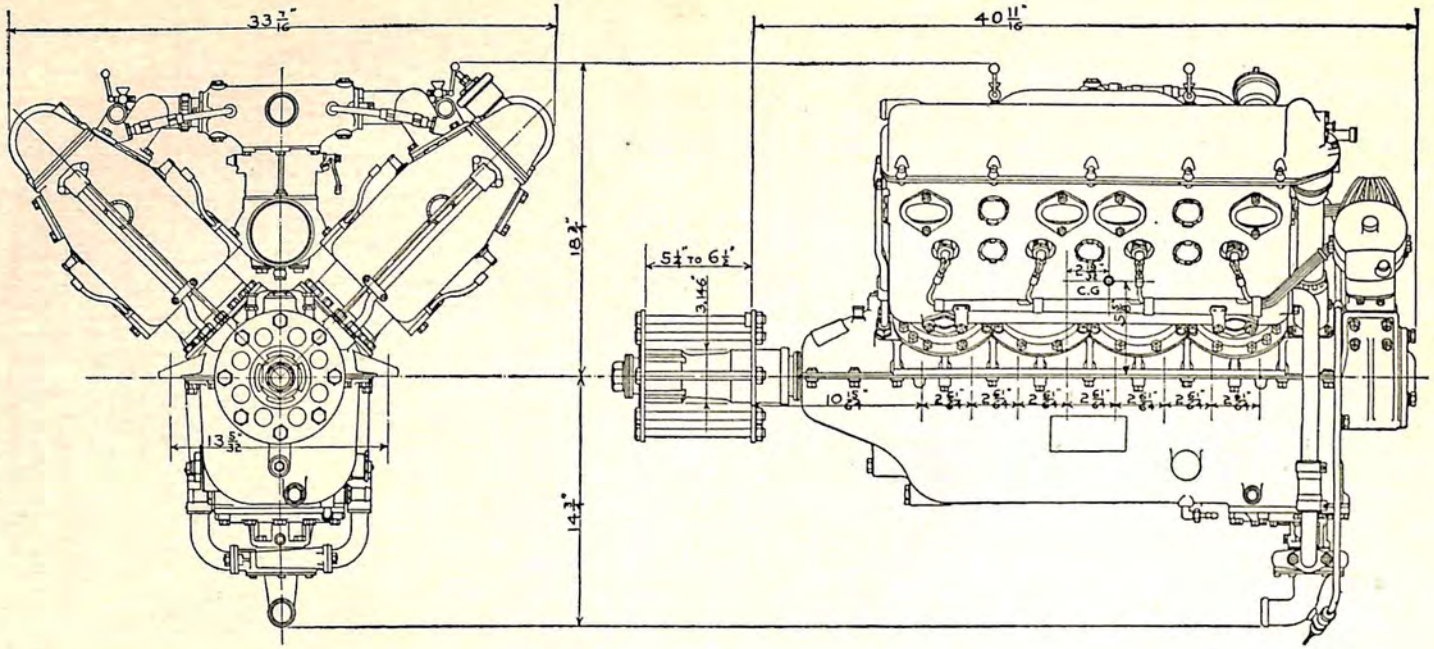
STANDARD 400 B.H.P. AT 1400 R.P.M. 1320 LBS. DRY



WRIGHT AERONAUTICAL CORPORATION – PATERSON, N.J.

MODEL - T2 12 CYLINDERS WATER COOLED

STANDARD - 525 B.H.P. AT 1800 R.P.M. 1150 LBS. DRY



WRIGHT AERONAUTICAL CORPORATION – PATERSON. N.J.

MODEL - E3 8 CYLINDERS WATER COOLED

STANDARD - 190 B.H.P. AT 1800 R.P.M. 480 LBS. DRY

ALERT – 240 B.H.P. AT 2100 R.P.M. 480 LBS. DRY

APPENDIX

COMMERCIAL SECTION

AERONAUTICAL CHAMBER OF COMMERCE OF AMERICA, INC.

501 Fifth 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.

GOVERNORS

Samuel S. Bradley
B. E. Bushnell
Charles H. Colvin
Sherman M. Fairchild
Allan Jackson
J. M. Larsen
Charles L. Lawrance
Grover C. Loening
Charles F. Redden
F. B. Rentschler
F. H. Russell
Lawrence B. Sperry
Inglis M. Uppercu
C. C. Witmer
W. C. Young

OFFICERS

President ..... Inglis M. Uppercu
First Vice-President ..... Charles L. Lawrance
Second Vice-President ..... C. C. Witmer
Third Vice-President ..... Lawrence B. Sperry
Treasurer ..... Charles H. Colvin
General Manager and Ass't Treasurer ..... Samuel S. Bradley
Secretary ..... Luther K. Bell
Ass't Secretary ..... Owen A. Shannon

COMMITTEES

Executive

I. M. Uppercu, chairman
S. S. Bradley
C. H. Colvin
F. B. Rentschler
F. H. Russell

Airship

H. T. Kraft, chairman
Henry Wacker
Harry Vissering
Ralph Upson
C. C. Witmer

Air Terminal

C. F. Redden, chairman
Archibald Black
C. S. Jones
and all State or Local Committeemen

Aircraft Standardization

F. H. Russell, chairman
C. F. Redden
Grover C. Loening
A. H. Flint
S. S. Bradley

Membership

F. B. Rentschler, chairman
C. H. Colvin
L. D. Gardner

Patent

Stephen H. Philbin
J. P. Tarbox

Trade Practice

Grover C. Loening, chairman
J. R. Cautley
J. M. Johnson
C. H. Colvin
W. A. Kidder

Flying Meet and Show Committee

I. M. Uppercu, chairman
F. H. Russell
J. R. Cautley
W. C. Young
S. S. Bradley

1923 Air Institute Committee

F. H. Russell, Aeronautical Chamber of Commerce, chairman
Dr. G. W. Lewis, National Advisory Committee of Aeronautics
Prof. E. P. Warner, American Society of Mechanical Engineers
L. Clayton Hill, Society of Automotive Engineers
Hugh W. Robertson, National Aeronautic Association

State Committeemen

California	William Klein, San Francisco; Wm. Henry, Los Angeles.
Delaware	E. R. Armstrong, Wilmington.
Illinois	Allan Jackson, Chicago.
Indiana	Fred M. Ruddell, Kokomo.
Iowa	L. B. Strothman, Waterloo.
Kansas	A. K. Longren, Topeka; E. M. Laird, Wichita.
Maryland	Temple N. Joyce, Baltimore.
Massachusetts	E. P. Warner, Cambridge.
Michigan	J. G. Vincent, Detroit.
Missouri	W. B. Robertson, St. Louis.
Minnesota	W. A. Kidder, Minneapolis.
New Jersey	C. D. Hanscom, East Orange.
New York	A. J. Elias, Buffalo; Raymond Ware, Ithaca.
Ohio	J. M. Johnson, Dayton; Henry Wacker, Akron; C. E. Thompson, Cleveland.
Pennsylvania	G. Sumner Ireland, Philadelphia.
Rhode Island	Frank B. Rhodes, East Greenwich.
Texas	S. C. Coon, Dallas.
Washington	Foster Russell, Spokane.
Washington, D. C.	Frank H. Russell.
Wisconsin	T. F. Hamilton, Milwaukee.

MEMBERS

Pioneers

Orville Wright, Dayton, Ohio.
Glenn H. Curtiss, Garden City, N. Y.

Manufacturing and Engineering

Aeromarine Plane & Motor Co., Keyport, N. J.
Airships, Inc., Hammondsport, N. Y.
Archibald Black, Consulting Engineer, Garden City, N. Y.
Curtiss Aeroplane & Motor Corp., Garden City, N. Y.
Dayton Wright Company, Dayton, O.
The Douglas Company, Los Angeles, Calif.
G. Elias & Bro., Inc., Buffalo, N. Y.
Gallaudet Aircraft Corp., East Greenwich, R. I.

B. F. Goodrich Rubber Co., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
E. M. Laird Company, Wichita, Kansas.
J. L. Aircraft Corp., New York City.
Lawrance Aero-Engine Corp., New York City.
L. W. F. Engineering Company, College Point, N. Y.
Loening Aeronautical Engineering Corp., New York City.
Longren Aircraft Corp., Topeka, Kans.
Luftschiffbau-Zeppelin (Harry Vissering), Chicago, Ill.
Manufacturers Aircraft Association, Inc., New York City.
Packard Motor Car Company, Detroit, Mich.
Remington-Burnelli Airplane Co., New York City.
Lawrence Sperry Aircraft Corp., Farmingdale, N. Y.
Stout Metal Airplane Co., Detroit, Mich.
Thomas-Morse Aircraft Corp., Ithaca, N. Y.
Chance Vought Corp., Long Island City, N. Y.
Wright Aeronautical Corp., Paterson, N. J.

Operators and Distributors

Aeromarine Airways, Inc., New York, Key West and Havana.
S. C. Coon (Curtiss Aircraft Corp.), Dallas, Texas.
Curtiss Aeroplane Export Corp., New York City.
Curtiss Eastern Airplane Co., Clementon (P. O. Pine Valley), N. J.
Curtiss Metropolitan Airplane Co., New York City.
Curtiss Northwest Airplane Co., Minneapolis, Minn.
Diggins Aviation Co., Chicago, Ill.
F. W. Farris, Stockton, Calif.
Valentine Gephart (International Aircraft Co.), Kansas City, Mo.
Orton Hoover (Curtiss Aeroplane Export Corp.), Rio de Janeiro, Brazil.
Huff Daland Aero Corp., Ogdensburg, N. Y.
W. M. Huskisson (Vickers, Ltd.), New York City.
Johnson Airplane & Supply Co., Dayton, O.
Temple N. Joyce (Morane-Saulnier), Baltimore, Md.
W. Wallace Kellett (Farman), Philadelphia, Pa.
Kokomo Aviation Corp. (Fred M. Ruddell), Kokomo, Ind.
Lawrence Leon (Curtiss Aeroplane Export Corp.), Buenos Aires, Argentina.
R. B. C. Noorduyn (Fokker), New York City.
Robertson Aircraft Corp., St. Louis, Mo.
Foster Russell Aviation Co., Spokane, Wash.
Daisy Smith, Spokane, Wash.
Marion Sterling, Waco, Texas.
Triangle Airways, Inc., Chicago, Ill.
Walter T. Varney, San Francisco, Calif.
Chester L. Williams (Williams Bros. Aircraft Corp. of Calif.), San Francisco, Calif.
John Perry Wood, Louisa, Ky.

Accessories and Supplies

A. C. Spark Plug Co., Flint, Mich.
Aircraft Development Corp., Detroit, Mich.
Aluminum Company of America, Pittsburgh, Pa.
American Bronze Corp., Berwyn, Pa.

American Gas Accumulator Co., Elizabeth, N. J.
American Hammered Piston Ring Co., Baltimore, Md.
B. G. Corp., New York City.
Bijur Motor Appliances Co., Hoboken, N. J.
Brewster & Co., Long Island City, N. Y.
Dayton Wire Wheel Co., Dayton, O.
Eberhart Steel Products, Buffalo, N. Y.
Electric Storage Battery Co., Philadelphia, Pa.
Endicott Forging & Mfg. Co., Endicott, N. Y.
General Aluminum & Brass Mfg. Co., Detroit, Mich.
Grant Marine Motor Co., Detroit, Mich.
Hamilton Aero Mfg. Co., Milwaukee, Wis.
Stewart Hartshorn Co., New York City.
Haskelite Mfg. Corp., Chicago, Ill.
Linde Air Products Co., New York City.
Macwhyte Co., Kenosha, Wis.
C. L. Maguire Petroleum Co., Chicago, Ill.
Meisel Press Mfg. Co., Boston, Mass.
Mosler Metal Products Corp., Mt. Vernon, N. Y.
New Jersey Veneer Co., Paterson, N. J.
Park Drop Forge Co., Cleveland, O.
Pennsylvania Hardware & Paint Co., New York City.
Perry-Austen Mfg. Co., Grasmere, Staten Island, N. Y.
Pioneer Instrument Co., Brooklyn, N. Y.
Radio Corp. of America, New York City.
Rich Tool Co., Chicago, Ill.
Simms Magneto Co., East Orange, N. J.
S. K. F. Industries, New York City.
Sperry Gyroscope Co., Brooklyn, N. Y.
Splitdorf Electrical Co., Newark, N. J.
Standard Oil Co. (Indiana), Chicago, Ill.
Steel Products Co., Cleveland, O.
Stromberg Motor Devices Company, Chicago, Ill.
The Texas Co., New York City.
U. S. Touring Information Bureau, Waterloo, Iowa.
Valentine & Co., New York City.
Wamsutta Mills, New Bedford, Mass.
Western Brass Mfg. Works, Chicago, Ill.
Wolverine Lubricants Co. of New York, New York City.
The Wood & Spencer Co., Cleveland, O.
Wyman-Gordon Co., Worcester, Mass.
Zenith Carburetor Co., Detroit, Mich.

Aerial Photography

Eastman Kodak Co., Rochester, N. Y.
J. A. Davis (General Photographic Service), New York City.
Fairchild Aerial Camera Corp., New York City.
Great Lakes Aerial Photographic Co., Cleveland, O.
Hamilton Maxwell, New York City.
Photomap Co. (Leon T. Eliel), Pasadena, Cal.

Publications

Aerial Age Weekly (G. Douglas Wardrop), New York City.
Aeronautical Digest (Chas. J. Glidden), New York City.

American Machinist (Fred H. Colvin), New York City.
Army and Navy Journal (H. J. Reilly), New York City.
Aviation and Aircraft Journal (L. D. Gardner), New York City.
Cine-Mundial (A. J. Chalmers), New York City.
Class Journal Company (David Beecroft), New York City and Chicago.
U. S. Air Service Magazine (Earl N. Findley), Washington, D. C.

Insurance

H. Barber, Underwriting Agent, Hartford Fire Insurance Co., and Hartford Accident & Indemnity Co., New York City.
R. R. Blythe, Johnson & Higgins, New York City.
National Aircraft Underwriters' Assn., New York City.
J. Brooks, B. Parker, Philadelphia, Pa.
R. W. Schroeder; A. R. Smale, Underwriters Laboratories, Chicago, Ill.

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Frank E. Baldwin, Wright Aeronautical Corp.
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Richard H. Depew, Jr., Fairchild Aerial Camera Corp.
Ladislas d'Orcy, Aviation and Aircraft Journal.
Donald Douglas, The Douglas Company.
Sherman M. Fairchild, Fairchild Aerial Camera Corp.
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J. C. Mars, New York City.
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H. L. Mingos, New York City.
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Arthur E. Nesbitt, Fairchild Aerial Camera Corp.
Arthur Nutt, Curtiss Aeroplane & Motor Corp.
C. G. Peterson, Wright Aeronautical Corp.
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H. L. Pope, Wright Aeronautical Corp.
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NATIONAL AERONAUTIC ASSOCIATION OF U. S. A. (INC.)

26 Jackson Place, Washington, D. C.

OBJECTS AS SET FORTH IN THE ARTICLES OF INCORPORATION

To foster, encourage and advance the science of aeronautics and all kindred and allied sciences. To encourage and promote the study and advancement of the science of aerial navigation of every kind and to hold and conduct conferences and congresses for the purpose of such study. To kindle and keep alive a general interest in the art of flying and to lend its aid and encouragement to any person, organization or institution which is engaged in advancing this art. To advise and encourage those engaged in the trade and business of manufacturing and for operating any and all types of aircraft, aeronautic machinery and parts and general equipment and supplies used in aeronautics and in various systems of aerial navigation by supplying general or scientific knowledge of such subjects or by lending financial encouragement therein. To establish, maintain and conduct, and also lend its support and financial aid to societies, clubs, classes, schools, colleges, corporations and other institutions engaged in whole or in part in promoting the study or advancing the science of aviation or allied and kindred sciences. To gather, compile and disseminate general and scientific data of every kind having to do with the science of aviation or any of the allied and kindred sciences, and to edit and publish the same in the form of bulletins, pamphlets, magazines and books and to generally distribute the same. To aid and encourage the establishment and maintenance of a uniform and stable system of laws relating to the science of aeronautics and the art of aerial navigation and all kindred and allied sciences and arts. To encourage the study, establishment and promulgation of uniform customs, ground rules, flying rules, plans and routes for aviation. To collect, edit and disseminate general and scientific knowledge of flying fields, flying routes, inter-state and foreign aerial postal routes, atmospheric conditions and other kindred knowledge, to foster progress in the science of manufacturing, improving and for operating any and all kinds of aircraft, to encourage inventions and improvements having to do or connected with aerial navigation. To encourage, promote, arrange for and carry on aerial expositions, exhibits and contests in order that the general interest in aviation may be developed and sustained as well as the science advanced and perfected, to sanction contests and formulate rules, administer such rules, certify records, and to grant or contribute toward the granting of awards, prizes and distinctions for the improvement, encouragement and advancement of any and all branches of aviation. To co-operate with the executive departments, commissions and other agencies of State or Federal Governments in their investigations of and legislation pertaining to aviation and at the request or suggestion of such departments, commissions or agencies, to furnish such information as may be possessed by this corporation.

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U. S. AIR SERVICE, WAR DEPARTMENT

Munitions Building, Washington, D. C.

Organization

Under the reorganization of the Office of Air Service approved by General Patrick on December 1, 1921, six divisions in the Army Air Service are provided: Personnel; Information; Training and War Plans; Supply; Industrial War Plans Division; and Engineering. The office of the Chief includes Assistant Chief and the Executive Office. Subordinates to the Executive Office are the Finance and Medical Sections, the Legal Advisor, and the Director of Aircraft Production (Spruce Production Corporation). The Chief Clerk conducts the routine administration of the civilian personnel on duty in the office of the Chief of Air Service in conformity with Civil Service Rules, existing War Department regulations and orders, and the announced policy of the Chief of Air Service. The Personnel Division is composed of two sections—Officers and Enlisted. The Information Division comprises the Library Section, Special Section and Reproduction Section. Five sections comprise the Training and War Plans Division: Schools, Tactical Units, Reserve Officers Training Corps, National Guard and Officers Reserve, War Plans Section and Airways Section. The Supply Division embraces Property Requirements, Procurement, and Material, Disposal and Salvage. The Industrial War Plans Division is divided into three branches—Requirements, Statistical, and Planning. The Engineering Division, located at McCook Field, Dayton, Ohio, is composed of Planning, Technical, Factory, Flying, Procurement, Supply, Patents and Military Sections. A representative of McCook Field is on duty in Washington.

Officers on Duty in Washington

Office of the Chief

Maj. Gen. Mason M. Patrick.....Chief, Air Service.
*Brig. Gen. William Mitchell.....Ass't Chief, Air Service.
*Maj. Walter H. Frank.....Executive.
*Capt. H. R. Harmon.....Ass't Executive.
*Maj. E. C. Johnson (JAGD).....Legal Adviser.

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*Maj. L. H. Drennan.
*Lieut. H. E. Hodge.

Information Division

*Maj. Ira A. Rader.
*Lieut. Corley P. McDarment.
*Lieut. D. S. Seaton.
*Lieut. C. H. Mills (MID Liaison).

Industrial War Plans Division

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Capt. D. B. Howard (Balloon Observer).
*Lieut. A. S. Albro.

Supply Division

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*Maj. H. H. C. Richards.

*Airplane Pilot.

Supply Division (Continued)

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*Lieut. S. A. Blair.
*Lieut. C. V. Haynes.
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*Maj. H. A. Strauss.....(Airship pilot—Lighter-than-Air School).
*Maj. E. L. Hoffman.....Equipment Section.
*Maj. H. W. Harms.....(Eng. Liaison Officer on duty OCAS).
*Lieut. E. E. Harmon.....On duty OCAS.

*Airplane Pilot.

ARMY CORPS AREAS AND DEPARTMENTS

First Corps Area—Includes Maine, New Hampshire, Vermont, Massachusetts, Connecticut and Rhode Island; headquarters, Army Base, Boston 9, Mass. Air Service Officer, *Maj. Edwin B. Lyon.

Second Corps Area—Includes New York, New Jersey and Delaware; headquarters, Governors Island, N. Y. Island of Porto Rico, with islands and keys adjacent thereto, is, for administrative purposes attached to Second Corps Area. Air Service Officer, *Maj. Arnold N. Krogstad.

Third Corps Area—Includes Pennsylvania, Maryland, Virginia, and District of Columbia; headquarters, Standard Oil Building, Baltimore, Md. Air Service Officer, *Maj. John B. Brooks.

Fourth Corps Area—Includes North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee, Mississippi, and Louisiana; headquarters, Ft. McPherson, Ga. Air Service Officer, *Capt. Otto G. Trunk.

Fifth Corps Area—Includes Ohio, West Virginia, Indiana, and Kentucky; headquarters, Ft. Hayes, Columbus, Ohio. Air Service Officer, *Maj. Maxwell Kirby.

Sixth Corps Area—Includes Illinois, Michigan, and Wisconsin, Jefferson Barracks, Mo.; headquarters, 6th C. A., 1819 W. Pershing Road, Chicago, Ill. Air Service Officer, *Lieut. Alfred L. Jewett.

Seventh Corps Area—Includes Missouri, Kansas, Arkansas, Iowa, Nebraska, Minnesota, North Dakota and South Dakota; headquarters, Army Building, Omaha, Neb. Air Service Officer, none designated.

Eighth Corps Area—Includes Texas, Oklahoma, Colorado, New Mexico, and Arizona; headquarters, Ft. Sam Houston, San Antonio, Texas. Air Service Officer, *Lieut. Col. Clarence C. Culver.

Ninth Corps Area—Includes Washington, Oregon, Idaho, Montana, Wyoming, Utah, Nevada, and California; headquarters, Presidio, San Francisco, Cal. Air Service Officer, *Lieut. Col. Wm. E. Gillmore.

Hawaiian Department—Includes Hawaiian Islands and dependencies; headquarters, Honolulu, Hawaii. Air Service Officer, *Capt. Geo. E. Stratemeyer.

Philippine Department—Includes all of Philippine archipelago and troops in China; headquarters, Manila, Philippine Islands. Air Service Officer, *Maj. Byron Q. Jones.

Panama Canal Department—Includes entire Canal Zone; headquarters, Quarry Heights, Balboa Heights, Canal Zone. Air Service Officer, *Maj. Raycroft Walsh.

STATIONS AND ACTIVITIES UNDER JURISDICTION OF CHIEF OF AIR SERVICE

Name	*P. O. Address*	*Activity*
Akron, Ohio	c/o Goodyear Tire & Rubber Co., Akron, O.	District Office. Balloon Production & Inspection Procurement Sec.

*Pilot.

Name	*P. O. Address*	*Activity*
Americus Air Intermediate Depot (Souther Field)	Americus, Ga.	Closed.
Brooks Field	San Antonio, Tex.	11th School Group Hdqrs. 46th & 47th School Sqdns. 24th Photo Sec. 62d Service Sqdn. A. S. Primary Flying School. Flying Cadet Detach.
Carlstrom Field	Arcadia, Fla.	Closed.
Chanute Field	Rantoul, Ill.	A. S. Technical School. School Troops, 5th Photo Sec. 15th Obs. Sqdn. (R.S.)
Curtiss Elmwood Air Reserve Depot	2050 Elmwood Ave., Buffalo, N. Y.	Closed.
‡Ellington Field	Houston, Texas	Temporary Storage Depot.
Fairfield Air Intermediate Depot (& Wilbur Wright Field)	Fairfield, Ohio	98th Obs. Sqdn. (R.S.). 7th Photo Sec. Supply Depot. Property Maintenance & Cost Compilation Sec.
Kelly Field	Kelly Field, Tex.	3d Attack Group Hdqrs. 8th, 13th, 26th and 90th Attack Sqdns. 10th School Group Hdqrs. 40th, 41st, 42d and 43d School Sqdns. 60th & 68th Service Sqdns. 22d Photo Sec. 1st Wing Hdqrs. Flying Field, Advanced Flying School.
Langley Field	Hampton, Va.	2d Wing Hdqrs. 50th Obs. Sqdn. (R.S.). 19th Airship Co. 2d Bomb. Group Hdqrs. 11th, 20th & 96th Bomb. Sqdns. 58th & 59th Service Sqdns. 2d & 20th Photo Sec. Field Officers' School. Flying Field.

Name	*P. O. Address*	*Activity*
Little Rock Air Intermediate Depot	Little Rock, Ark.	Storage Depot.
Long Island Air Reserve Depot	U. S. Aeronautical Engine Plant, Long Island, N. Y.	Closed.
McCook Field	Dayton, Ohio	Engineering Div., A. S. Engineering School.
Middletown Air Intermediate Depot	Middletown, Pa.	Supply Depot.
*Mitchel Field	Garden City, L. I. New York.	Medical Research Laboratory Flight Surgeons' School.
New York, N. Y.	Room 308	District Property & Survey Officer.
	Room 807, 39 Whitehall St., New York, N. Y.	District Office Procurement Sec., Supply Div.
Portland, Oregon	Couch Building, Portland, Oregon.	U. S. Spruce Production Corp.
Richmond Air Intermediate Depot	Richmond, Va.	Closed.
Rockwell Air Intermediate Depot	Rockwell Field Coronado, Calif.	Supply & Repair Depot. ‡Flying Field.
‡Ross Field	Arcadia, Calif.	A. S. Detach. (Unassigned.)
San Antonio Air Intermediate Depot	Kelly Field, Texas	Supply Depot. Aviation & Repair Depot.
Scott Field	Belleville, Ill.	8th, 9th and 12th Airship Cos. 21st Airship Group Hdqrs. 21st Photo Service. 24th Airship Service Co. A. S. Balloon & Airship School. Air Intermediate Depot.

* See stations under jurisdiction of Corps Area, District or Department Commanders.
† Correspondence through C. O., District of Washington.
‡ Inactive.

STATIONS AND ACTIVITIES UNDER JURISDICTION OF CORPS AERO DISTRICT OR DEPARTMENT COMMANDERS

Station	*P. O. Address*	*Troops and Activities*
Bliss, Ft., Texas	El Paso, Texas	1st Photo Sec. 12th Obs. Sq. (R.S.) 32d Air Intell. Sec. Border Patrol.
†Bolling Field	Anacostia, D. C.	Hdqrs. Detach. 3d Photo Sec. 99th Obs. Sqdn. (R.S.) 56th Service Sqdn. (R.S.) Flying Field.
Chapman Field	Miami, Fla.	Closed.
Clark Field	Camp Stotsenburg, Pampanga, P. I.	28th Bomb. Sqdn. 3d Pursuit Sqdn. Aerial Coast Defense.
Clover Field	Santa Monica, Calif.	Troops: None. Airdrome in process of construction.
Crissy Field	Presidio of San Francisco, Calif.	33d Air Intell. Sec. 91st Obs. Sqdn. 15th Photo Sec. Aerial Coast Defense. Forest Patrol.
France Field	Panama, C. Z.	6th Composite Group Hdqrs. 7th Obs. Sqdn. 12th Photo Sec. 40th Air Intell. Sec. 63d Service Sqdn. 24th Pursuit Sqdn. 25th Bomb. Sqdn. Aerial Coast Defense.
Kindley Field	Fort Mills, Corregidor Island, P. I.	2d Obs. Sqdn. Aerial Coast Defense.
Langin Field	Moundsville, W. Va.	Intermediate Landing Field.
Luke Field	Ford's Island, Pearl Harbor, Oahu, H. T.	5th Comp. Group Hdqrs. 6th Pursuit Sqdn. 65th Service Sqdn. 11th Photo Sec. 41st Air Intell. Sec. 23d Bomb. Sqdn. Aerial Coast Defense.

Name	*P. O. Address*	*Activity.*
March Field	Riverside, Calif.	Closed.
‡Mather Field	Mills, Calif.	A. S. Detach.
Maxwell Field	Montgomery, Ala.	22d Obs. Sqdn. 4th Photo Sec.
*Mitchel Field	Garden City, L. I., New York.	9th Obs. Group Hdqrs. 8th & 14th Photo Sec. 1st & 5th Obs. Sqdns. 31st Air Intell. Sec. 61st Service Sqdn.
Nichols, Camp	Philippine Islands	4th Comp. Group Hdqrs. 66th Service Sqdn. 6th Photo Sec. Aerial Coast Defense.
Park Field	Millington, Tenn.	Closed.
Philippines	Manila, P. I.	42d Air Intell. Sec. Aerial Coast Defense.
Post Field (see Ft. Sill)		
Selfridge Field	Mt. Clemens, Mich.	1st Pursuit Group Hdqrs. 57th Service Sqdn. 17th, 27th, 94th & 95th Pursuit Sqdns.
Wheeler Field	Schofield Barracks, Honolulu, Hawaii.	4th Obs. Sqdn. Aerial Coast Defense.
Aberdeen Proving Grounds.	Aberdeen Proving Grounds, Md.	18th Airship Co. (R.S.) 49th Bomb. Sqdn. Ordnance Proving Ground.
Pope Field	Fayetteville, N. C.	Detach. 22d Obs. Sqdn. Artillery Firing Center.
Riley, Fort	Ft. Riley, Kansas	16th Obs. Sqdn. (R.S.) 9th Photo Sec., Cavalry School.
Sill, Fort	Ft. Sill, Okla.	44th Obs. Sqdn. (R.S.) 23d Photo Sec. Field Artillery School. Flying Field.

* See stations under jurisdiction of Chief of Air Service.
† Correspondence through C. O., District of Washington.
‡ Inactive.

RELATION OF AIR SERVICE TO NATIONAL GUARD AND RESERVES

The question is continually arising as to what the Air Service is endeavoring to accomplish in the way of providing for the Air components of the Organized Reserves and the National Guard. It is now possible to state in general the policies of the Chief of Air Service, as a part of the general plan of the War Department, for the organization and training of the Air Service of the Organized Reserves and the National Guard.

Paragraph 3c, Special Regulations Number 46, states the missions of the Organized Reserves as follows:

> (1) To provide a trained, organized, and balanced force which may be readily expanded and developed into an adequate war component of the Army of the United States to meet any major emergency requiring the use of troops in excess of those of the Regular Army and the National Guard.
>
> (2) The Organized Reserves are the third component of the Army of the United States.
>
> (3) The Regular Army and the National Guard may be employed separately or together in minor and major emergencies, but the Organized Reserves constitute purely a war force and can be employed only in the event of a national emergency declared by Congress.

From the above, it will be seen that the Organized Reserves constitute a "war force" and can be employed only in the event of an emergency declared by Congress—in other words they would not be called upon unless the emergency was such that it could not be handled by the Regular Army and the National Guard.

It appears to be the general impression that it is the intention of the Federal Government to arm and equip Reserve units so that they will be ready to take the field at once. This is obviously out of the question, for several reasons:

a. The Organized Reserves could not properly care for and maintain the equipment.
b. The cost would be prohibitive.
c. It would be necessary to retain an enormous amount of obsolescent and obsolete equipment.
d. Reserve Officers on an inactive status cannot legally be held responsible for government property.

Thus, as far as the Air Service is concerned, the use of government flying equipment must be limited to that on hand at our regular Air Service stations and at the Reserve airdromes now being and to be constructed.

The allocation to the states, territories, and the District of Columbia, of units of the Organized Reserves, within the departments and corps areas, is being made by corps area commanders under the direction of the War Department. A large percentage of these allocations has already been made and the great majority of Air Service Reserve officers have been attached or

assigned to units. In order to assist in the task of Reserve organization and training, twenty Regular Air Service officers have already been assigned to corps area commanders and more officers will be detailed as they become available, and as the work proceeds. The work of these officers is of a continuing nature, and therefore, cannot be performed by Reserve officers. In general the duties of the Regular officers are as follows:

a. To organize Reserve units.
b. To assign Reserve officers to units near their homes.
c. To take charge of training of personnel and units over which they have supervision.
d. To endeavor to induce those qualified by law to accept commissions in the Organized Reserves.
e. To do everything within their power to arouse and hold the morale of Reserve Organizations.

The law contemplates that, as far as possible, units shall be complete as to officer personnel but that, for the present, enlisted strength shall be limited to that necessary to provide the essential numbers and grades of non-commissioned officers and specialists. The personnel is limited to members of the Officers and the Enlisted Reserve Corps. Thus it will be seen that, unlike the Regular Army and the National Guard, both officers and enlisted men of the Organized Reserves must be obtained from those eligible for the Officers and Enlisted Men's Reserve Corps and are, therefore, men who have had at least some military training.

It might appear from the above that the Organized Reserves are only a "Paper Organization." Such is not the case, and the Organized Reserves, when their organization is complete, will be a strong potential force, whose real value can be summarized as follows:

a. All units have been organized.
b. Commissioned personnel, non-commissioned officers, and specialists have been assigned.
c. Mobilization plans have been made, and training and concentration points selected.
d. Equipment has, as far as practicable, been assembled in convenient depots for use in case of emergency.
e. Personnel has had an opportunity by means of lectures, conferences, correspondence, courses, etc., to keep up to date, both tactically and technically.
f. A certain percentage of the personnel has been given an opportunity for practical instruction during the fifteen day field training period conducted each summer.
g. The personnel has had an opportunity to affiliate and work together.

The Air Service Reserve Corps consists of more than 8,000 officers. Of this number more than 5,000 hold some kind of flying ratings. It is thoroughly realized that in order to hold the interest of these flying officers and further, to make it possible to rapidly complete their training in case of an emergency, it is essential that they be given every opportunity to fly. As shown above, flying equipment cannot be issued to Reserve units, so that everything possible is being done to make flying available to the individual, although the flying must, necessarily, be given under Federal supervision. At our regular airdromes flying equipment is usually available when the Reserve pilot presents

himself with the proper credentials, and instructions have been issued to all commanding officers to accommodate Reserve officers whenever possible.

In order to increase flying facilities for Reserve officers and further to assist in providing a system of airways necessary for the national defense, and for the development of aeronautics in general, the Chief of Air Service has outlined a program calling for the establishment of airdromes at certain of our larger centers of population and industry. This program has in principle received the approval of the Secretary of War. The original project contemplated construction of twenty-one of these airdromes, however, due to lack of funds, only four of them, i.e., Boston, Mass., Pittsburgh, Pa., Kansas City, Mo., and Los Angeles, Cal., are actually under construction. An item of funds which would have provided for the establishment of ten additional Reserve airdromes was requested by the Chief of Air Service for the present fiscal year, but was stricken out of the appropriation bill by the committee. However, it is hoped to secure sufficient funds in the appropriation for the fiscal year 1924 to provide for a continuation of this progress. The Chief of Air Service considers the matter of Reserve airdromes one of the most important before the army today.

To provide training in Air Service subjects other than flying, the War Department has inaugurated a system of Army Correspondence Courses, open to personnel of the Officers and Enlisted Reserve Corps, personnel of the National Guard, who may individually volunteer to undertake such courses in addition to their required National Guard duties, and to qualified civilians, if facilities for instruction are adequate. These courses are designed to provide the citizen soldier with an opportunity for study and instruction which will assist in fitting him to perform the active duties of his branch, and which will also prepare him for promotion to the higher grades. If carefully studied, they will bring him up to date both tactically and technically. It is contemplated that correspondence courses in Air Service subjects now under preparation will be inaugurated within the very near future. Separate courses will be prepared for the personnel of the Heavier-than-Air and the Lighter-than-Air branches. For Heavier-than-Air the scope of the courses will include such subjects as airplanes, motors, rigging, aerodynamics, instruments, tactics, operations, observation, bombardment, pursuit and attack aviation, and for the Lighter-than-Air, free and captive balloons, airships, areostatics, aerodynamics, motors, winches, instruments and gases, while subjects common to both branches embrace administration, military law, army organization, military courtesy, customs of the service, military hygiene, map reading, gas defense, minor tactics, communications and gunnery, and Air Service organization and tactics. To any officer or man interested in maintaining contact with the army as a whole, and with the specialized work of his one branch in particular, these courses afford an unrivaled opportunity for training.

During the summer of 1922, training camps for Reserve officers of the Air Service were held in each of the nine corps areas comprising the territorial United States. Reserve officers were, upon their own applications, ordered to active duty for a period of two weeks to attend these camps. It is no exaggeration to state that in each case these reserve officer camps were highly successful, both from the point of view of the Air Service and of Reserve officers in attendance, many of whom have expressed to the Chief of Air Service their satisfaction at the treatment they received, and the benefits derived from the training given. It is contemplated that these camps are to be made an annual institution and, funds permitting, are eventually

to be enlarged until all those officers making application for this training may be accommodated.

Air Service participation in six Reserve Officers' Training Corps units may also be considered a part of our reserve project. These units are established as follows: Massachusetts Institute of Technology, Cambridge, Mass.; Georgia School of Technology, Atlanta, Ga.; University of Illinois, Urbana, Ill.; Texas Agricultural and Mechanical College, College Station, Texas; University of California, Berkeley, Cal., and University of Washington, Seattle, Wash. Practically all the students enrolled in these units are undergoing courses in engineering, and the four years' course of special Air Service instruction fits naturally into their college work. Curricula include everything of a technical and theoretical nature which can be taught on the ground. During the past summer the advanced students at each of the above units participated in six weeks' training camps at regular airdromes. These training camps were very successful. In addition to lectures, conferences, demonstrations and shop practice, each student was given several hours' actual instruction as an observer in the air. Plans contemplate that each R.O.T.C. graduate shall be commissioned in the Reserve and called to six months' active duty when he will be given flying instruction. However, funds have not yet been sufficient to carry out this, a very important part of the R.O.T.C. program.

To date seven observation squadrons of the National Guard have received Federal recognition, namely, Boston, Mass., New York City, Baltimore, Md., Birmingham, Ala., Kokomo, Ind., Nashville, Tenn., and St. Paul, Minn. Of these organizations all except that at Boston, Mass., have received their flying equipment and are actually operating. The Boston unit will receive its airplanes upon completion of the airdrome now in process of construction in that city. All flying equipment is furnished by the War Department from surplus stock, or stock in excess of current requirements, without reimbursement, and the Air Service has assigned an officer instructor to duty with each of these units. The work undertaken by these squadrons to date, and the enthusiasm of their personnel, both commissioned and enlisted, is most encouraging to those of the Regular Air Service who have been associated in any way with the organization, training or operation of these units, and their demonstrated efficiency in actual operations during the encampments of the past summer has been such as to merit the warmest praise from Air Service personnel. In each National Guard squadron there are a few officers who have never received flying ratings. Plans are now being considered for their training as follows:

(a) Officers who are competent to qualify, but who have never received a flying rating, will be ordered before boards of officers at our regular airdromes with a view to their taking a prescribed test. If found qualified, they will be rated by the Chief of Air Service.

(b) Officers who hold National Guard commissions at the present time, but who have never received flying training, will be permitted to take a four months' special course of instruction at our Primary Flying School at Brooks Field, San Antonio, Texas. At the end of this period of training, they should be thoroughly qualified in primary flying and will be given a special flying rating. Their advanced instruction will be received within their squadrons. This course will be given only to unqualified National Guard officers who were commissioned in the National Guard prior to July 1, 1922.

(c) To provide for replacements of National Guard officers, it is contemplated allotting four or five flying cadet vacancies each year to each National Guard squadron. The squadron will select the men to fill these vacancies from their enlisted personnel or otherwise. These men will be given the regular course at our Primary and Advanced Flying Schools, at the expense of the Federal Government. They will then be given reserve commissions and later commissioned by the National Guard in the squadrons from which they were sent.

It is hoped that this method will provide a constant flow of competent young flying officers into the National Guard.

It must be recognized that the maintenance and operation of an Air Service organization of the National Guard involve the expenditure of a considerable amount of money, both upon the part of the Federal Government in furnishing necessary equipment, and also upon the part of the state in supplying adequate flying fields, hangars and shop facilities. For this reason there has existed a feeling on the part of a number of the states that the benefits of the training derived are not commensurate with the relatively large expenditure of funds. However, the splendid showing of the existing units has done much to dissipate this sentiment, and it is now felt that units of an Air Service as a part of the National Guard are assured. It is believed that within the near future observation squadrons for the eighteen National Guard Divisions will be provided.

It will be seen, therefore, that the development of the Air components of the Organized Reserves and the National Guard is now proceeding satisfactorily and that a good start has been made toward making them a real force in the national defense system.

AIRWAYS SECTION

The Airways Section, under direction of Capt. Burdette Wright, completed one year's operation on December 1, 1922. A year ago there were 1,350 landing facilities noted in the Section and the greater part were inadequately reported in this office. Since that date the Section has increased this number to some 3,500 organized and unorganized landing facilities throughout the country. A standard questionnaire on landing fields and one on facilities for the landing of seacraft have been prepared, and also standard forms for filing. In addition, authority has been obtained from the Secretary of War to publish a sample form of "Aeronautical Bulletin" in the Government Printing Office, with a view to the future publication of loose-leaf sheets on each facility by the Government Printing Office, the same to be available not only to Government agencies, but to commercial organizations as well.

The proposed airway system of the United States has been revised since the establishment of the Airways Section, and some two-thirds of the airway system have been investigated by the various fields in this country. In May, 1922, the schedule of operations was begun on the Model Airway between New York, Washington, Norfolk and Dayton. To December 1, 1922, over 100,000 miles of flying have been completed, with few crashes and no injuries. The purpose of these flights is for the testing of equipment, navigation instruments, the practice and experience to be gained by the personnel, and the carrying of passengers and equipment between Model Airway stations. The Model Airway has been thoroughly investigated and over one hundred emergency fields picked out and arrangements made for their marking. This marking should be completed in the near future. By this regular flying a comprehensive system for the servicing of aircraft and the care of visiting pilots, etc., has been worked out at each of the Model Airway stations, and is producing very satisfactory results. The various fields on the Model Airway have Airway Representatives, who meet from time to time in Washington under the supervision of the Airways Section of the office, Chief of Air Service, for the coordination of ideas, the betterment of the service, and the consolidation of the experience gained by these operations.

Close liaison has been established by the Airways Section of this office with the Meteorological Section of the Signal Corps, and with the Weather Bureau of the Department of Agriculture. Definite arrangements have been completed whereby periodical forecasts are disseminated from Washington, Chicago and San Francisco, by radio, covering the various aviation forecasts zones in the United States. In addition, for the particular application of weather information to the Model Airway work, a Meteorological Control Officer for the Model Airway has been detailed to Bolling Field, where he is disseminating additional weather forecasts for the various routes on the Model Airway. He is, further, compiling all information received from the various pilots and endeavoring to bring the weather forecasting and reporting facilities to a degree of efficiency whereby they will serve the needs of aviation in a satisfactory manner.

Upon the organization of the Airways Section a careful study was made as to the requirements to be embodied in an aerial navigation map. The points covering these requirements were drawn up and forwarded to all Air Service activities for criticism. Upon receipt of the criticisms a thorough study was made and the most advisable characteristics compiled therefrom. These char-

acteristics were forwarded the Geological Survey and authority and funds obtained for the Geological Survey to prepare a sample map of Central California, the terrain of which was very well covered by available information. This sample map was forwarded to California for trial in the air, and upon receipt of report the information will be included in studies for future maps. In the meantime, the Geological Survey is about to complete a sample map of the country from Dayton to Wheeling, along these same lines. This sample will be tried by Model Airway pilots, and should it prove satisfactory the work will continue over the other legs of the Model Airway and over sections of the proposed airway system which are most frequently used at this time. It is contemplated expanding these strip maps into state maps in the future, all being made on the standard one to five hundred thousand scale of the Geological Survey, in order that the country eventually will have complete sets of state maps of the same scale, especially prepared for aviation.

The Engineering Division at Dayton was consulted with reference to the marking of airways, plans were drawn up, and a marking party sent out on the Washington-Dayton leg of the Model Airway. This party has completed the marking of some fifty odd towns by placing the names on the roofs of prominent buildings adjacent to the railway rights-of-way. In order to extend this system throughout the country, a conference was held on November 23d with a Joint Committee of the American Railway Assn. for the purpose of obtaining from them authority such as was previously obtained, as a trial, from the Pennsylvania Railroad, for the placing of these painted markers on the roofs of railroad stations throughout the country. The Committee recommended to the Board of Directors of the American Railway Assn. that this authority be granted.

The possibility of obtaining aviation weather reports along any desired route from the American Telephone & Telegraph Co. has been studied by this office and covered in conferences with that company.

The Airways Section has prepared, in addition, the following information for dissemination to towns considering the boosting of aviation: 1. The Airport, Its Characteristics, Its Necessity, and the Benefits to be Derived from Its Establishment. 2. Blueprint, showing the dimensions of fields and the means of marking. 3. Blueprint and instructions with reference to the installation of the International Identification Marker. 4. Co-operation of the Army Air Service with Outside Agencies for the years 1919, 1920 and 1921. 5. A model questionaire for landing fields and for seaplane facilities, filled out. 6. Airway plans of the United States.

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 among these divisions as follows: The Planning Division deals with the planning of the work of the Bureau, the formulation of plans of war in conjunction with the Planning Sections of the office of Naval Operations, recommendations concerning types of aircraft which are necessary for Naval Aviation. The Administration Division handles all civilian personnel employed 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 and matters pertaining thereto. The Flight Division had under its cognizance all matters pertaining to the operation of naval aircraft, training of personnel, aviation photographs and aerology.

Officers on Duty in Washington

Office of the Chief

Rear Admiral W. A. Moffett.....Chief, Bureau of Aeronautics.
*Capt. H. C. Mustin.....Asst. Chief, Bureau of Aeronautics.

Administration Division

*Commander V. K. Coman.
*Lieut. Comdr. R. M. Griffin.
*Lieut. S. H. Quarles.
Lieut. T. T. Patterson.
*Lieut. R. E. Byrd.

Material Division

Commander E. S. Land (Observer).
Commander J. C. Hunsacker.
Lieut. Comdr. W. W. Webster (Observer).
Lieut. Comdr. (Nav. Yd.) S. Picking.
*Lieut. Comdr. S. N. Kraus.
*Lieut. B. G. Leighton.
Lieut. (CC) R. S. Barnaby.
Lieut. (CC) C. H. Congdon.
Lieut. (CC) C. J. McCarthy.
*Lieut. Rico Botta.
*Lieut. J. M. Shoemaker.
*Lieut. (CC) C. N. Liquid.
Lieut. (CEC) V. R. Dunlap.

Material Division—Cont.

*Lieut. K. McGinnis.
*Lieut. S. B. McMurrain.
*Lieut. F. M. Mail.
Lieut. W. S. Diehl.
*Lieut. (jg) P. C. Warner.
*Lieut. (jg) V. C. McKenna.
*Ensign C. E. Bauch.
*Ch. Mach. R. H. Bush.

Plans Division

*Commander T. G. Ellyson.
*Lieut. W. M. Dillon.

Flight Division

*Lieut. Comdr. H. B. Cecil.
*Lieut. Comdr. E. W. Spencer.
*Lieut. G. Morgan.
*Lieut. A. W. Radford.
*Lieut. (Tem. det) F. W. Neilson.
*Lieut. H. B. Grow.
*Lieut. F. W. Reichelderfer.

*Pilot.

Marine Officers and Coast Guard Officers on Duty in the Bureau of Aeronautics

November 1, 1922

Plans Division	*Material Division*
*Lieut. Col. (USMC) T. C. Turner.	*1st Lieut. (USMC) B. G. Bradley.
	*Capt. (USMC) F. R. Mulcahy.
	*Capt. (USMC) W. H. Sitz.
	*Lieut. (jg) (USCG) E. F. Stone.

Officers with the Fleets

Scouting Fleet (Atlantic)

Capt. W. E. Gherardi.....Comdr. Aircraft Squadrons Scouting Fleet.
*Lieut. Comdr. W. Capehart....Aide to Comdr. Aircraft Sqds. Scouting Fleet.
*Lieut. H. T. Bartlett.....Commander Torpedo Plane Squadron No. 1.
*Lieut. J. C. Monfort.....Commander Scouting Plane Squadron No. 1.

Battle Fleet (Pacific)

Capt. A. W. Marshall.....Commander Aircraft Squadrons Battle Fleet.
*Lieut. Comdr. P. N. L. Bellinger.Aide to Comdr. Aircraft Sqds. Battle Fleet.
*Lieut. Comdr. R. A. Burg.....Comdr. Torp. and Bomb. Plane Sqd. No. 1.
*Lieut. Comdr. M. B. McComb.Comdr. Observation Plane Squadron No. 1.
*Lieut. Comdr. R. R. Paunack..Comdr. Observation Plane Squadron No. 2.
*Lieut. Comdr. P. M. Bates....Comdr. Fighting Plane Squadron No. 1.

Naval Air Stations

Officer in Command	*Place*
Anacostia, D. C.....	*Lieut. W. D. Thomas
Coco Solo, C. Z.....	*Lieut. Comdr. R. F. Wood
Hampton Roads, Va.....	Capt. H. E. Yarnell
Lakehurst, N. J.....	*Commander F. R. McCrary
Naval Aircraft Factory, Philadelphia.....	Commander G. C. Westervelt
Pearl Harbor, T. H.....	*Commander John Rodgers
Pensacola, Fla.	Capt. H. H. Christy
San Diego, Cal.....	Capt. T. T. Craven

*Pilot.

NAVY AERIAL TORPEDOES

The first torpedo plane practice in the history of the United States Navy was staged off the Virginia Capes on September 27th, when twenty planes of Torpedo and Bombing Squadron No. 1 of the Atlantic Fleet engaged in maneuvers and launched torpedoes against a battleship target.

The practice was a regularly scheduled exercise of the gunnery year and was in no sense designed to represent the spectacular and uncertain elements of battle conditions. It was, however, the fruits of painstaking development work covering a period of more than two years and represented a marked advance in the use of aircraft as an offensive naval weapon.

On the morning of September 27th three battleships of the Atlantic fleet and a large number of destroyers were approximately fifty miles due east of Cape Henry. The Torpedo plane squadron was located at the Naval Air Station, Hampton Roads, Va., where they had been training during the previous summer months. The zero hour when the planes were to leave the base and proceed to sea had been set by Vice-Admiral John C. MacDonald at 9 a. m., at which hour the ships were to take up a course unknown to the commander of the torpedo plane squadron.

Promptly at the hour designated the planes were launched at the Air Station and in division formation took the air in Hampton Roads and proceeded to sea. Eighteen of the torpedo planes carried torpedoes while the remaining two that made up the squadron carried Lieut. H. J. Bartlett and Lieut. E. L. Ericcson, commander and executive officer of the detachment, respectively, who were in charge of directing the maneuvers of the attacking planes.

The attacking planes passed out of the Virginia Capes without incident, flying at low altitude and headed to sea in search of the fleet. Shortly after 10 o'clock the torpedo planes made contact with the battleships and the latter proceeded to maneuver at 17 knots speed to keep the planes astern. When the planes overhauled the ships they were steaming on a course due east and were in column, the U.S.S. Wyoming leading, and the U.S.S. Arkansas and North Dakota following in the order named. The rules governing the practice made the middle ship in the formation, the Arkansas, the target vessel.

The torpedo plane squadron divided and maneuvered to attack on either flank of the battleships, the division under the command of Lieutenant Ericcson being the first to launch torpedoes on the port side of the line of ships. No defense against the torpedoes was made by the ships except that of maneuvering the ships by their rudders to avoid the track of the oncoming torpedoes, but soon the surface of the sea was lined with their wake as one another another was launched from the planes, which darted in from every favorable angle, let go, and swooped up and away from an imaginary anti-aircraft fire.

Out of the eighteen torpedoes carried by the planes to sea, seventeen were successfully launched and seven hits out of this total were credited to the planes. The eighteenth torpedo was not launched due to failure of the releasing gear to function.

The practice was viewed from the target vessel by Admiral Coontz, Chief of Naval Operations, and Rear Admiral W. A. Moffett, Chief of the Bureau of Aeronautics.

Vice Admiral John C. MacDonald, who commanded the fleet, was in

general charge of the maneuvers, and following the practice received a congratulatory message from the Secretary of the Navy which read:

> "Reports from the Commander-in-Chief and returning observers indicate that the torpedo plane practice completed off the Capes yesterday was well executed and that the maneuvers, both by the planes in attacking and the battleships in avoiding attack, demonstrated a high state of efficiency. The one hundred per cent performance of the torpedoes was most gratifying and creditable. The participation of forty planes and one dirigible and their prompt return to their bases after maneuvers seventy miles off the coast indicate the excellent condition of these forces. The Department is well pleased with the results of this practice and the advancement in the tactical use of fleet torpedo planes that it demonstrated. EDWIN DENBY."

High naval officials agreed that the practice was a success in all respects contemplated.

It is relevant to state that in no sense was the torpedo plane attack on the ships a test of the relative merits of aircraft versus battleships. As a part of scheduled exercises it was merely designed to test the advancement that had been made in the use of torpedoes by aircraft. The conditions under which the exercises were carried out were most favorable. None of the defensive measures that might be found in a wartime engagement between aircraft and surface ships were in use except the maneuvering power of the ships. No anti-aircraft fire was, of course, directed at the attacking planes and likewise no defensive aircraft opposed the attacking torpedo planes. The weather conditions were ideal in every respect as regards visibility and the comparatively smooth sea was welcomed as facilitating the recovery of the valuable torpedoes.

On the other hand many elements in favor of the torpedo planes were lacking. It is scarcely within the bounds of possibility that such an attack would be made in war time without the aid of combat planes, bombers, smoke screens and other tactical facilities.

The practice did show, however, that the torpedo plane has been developed to a point where it may seriously be reckoned in the category of naval aircraft; that planes can carry torpedoes against an enemy fleet and be counted on to make hits.

And the degree of success attained is particularly noteworthy in that it was achieved with the use of planes that are recognized as inadequate for this kind of work. These planes are now to be replaced by types which have lately been proven to be markedly superior to any in existence in this country or elsewhere, provided adequate financial support is given to the plans for naval aviation.

MARINE CORPS, NAVY DEPARTMENT

ORGANIZATION

Marine aviation is an integral part of the Marine Corps, and its mission is to furnish the air forces necessary to Marine expeditionary duty, Marine advanced base operations, and the defense of Naval bases outside the continental United States which are defended on shore by Marines. In peacetime, in addition to training and preparation for these duties, the Marine Corps aviation carries on air operations similar to those of the Army Air Service. Its officers are detailed to aviation duty from permanent line officers of the Corps and its enlisted men are Marines enlisted especially for aviation duty. The administration, training and operations of Marine aviation are directed by the Chief of Aviation, Headquarters U. S. Marine Corps, whose office constitutes a section of the division of Operations and Training of the Major General Commandant's Office. A new table for the aeronautic organization of the Marine Corps was approved by the Major General Commandant on July 30th and by the Chief of Naval Operations on August 3, 1922, and accordingly the aviation force of the corps has been redesignated and organized into the First Aviation Group, at Quantico, Va., consisting of one observation plane squadron, one fighting plane squadron, and one kite balloon squadron; Observation Squadron No. 1 at Santo Domingo City; Observation Squadron No. 2 at Port au Prince, Haiti; and Scouting Squadron No. 1 at Sumay, Guam.

OFFICERS

Lieut. Col. T. C. Turner.
Maj. E. H. Brainard.
Maj. Francis T. Evans.
Maj. Roy S. Geiger.
Capt. George W. Martin.
Capt. Louis M. Bourne.
Capt. Ralph J. Mitchell.
Capt. James E. Davis.
Capt. James T. Moore.
Capt. Robert E. Williams.
Capt. Francis P. Mulcahy.
Capt. Louis E. Woods.
Capt. Francis E. Pierce.
Capt. Walter E. McCaughtry.
Capt. Arthur H. Page.
Capt. Russell A. Presley.
Capt. Robert J. Archibald.
Capt. Harry H. Shepherd.
Capt. Thomas Shearer.
First Lieut. Harold D. Campbell.
First Lieut. John P. Adams.
First Lieut. William T. Evans.
First Lieut. James D. Colomy.
First Lieut. James A. Mixson.
First Lieut. Harold C. Major.
First Lieut. Jesse A. Nelson.
First Lieut. Fred S. Robillard.
First Lieut. Walter S. Hallenberg.
First Lieut. Ford O. Rogers.
First Lieut. Walter G. Farrell.
First Lieut. Merritt A. Edson.
First Lieut. Andrew R. Holderby.
First Lieut. Henry A. Carr.
First Lieut. William J. Wallace.
First Lieut. Harmon J. Norton.
Second Lieut. Thomas J. Cushman.
Second Lieut. Guy B. Hall.
Second Lieut. William L. McKittrick.
Second Lieut. Stanley E. Ridderhof.
Second Lieut. Jay D. Swartwout.
Second Lieut. Goodyear W. Kirkman.
Second Lieut. Lawson H. M. Sanderson.
Second Lieut. Jacob F. Plachta.
Second Lieut. Horace D. Palmer.
Second Lieut. Hayne D. Boyden.
Second Lieut. Franklin G. Cowie.
Second Lieut. Christian F. Schilt.
Second Lieut. Donald E. Keyhoe.
Second Lieut. James H. Strouthers.
Second Lieut. Joe N. Smith.

AVIATION STATIONS

First Aviation Group, Marine Barracks, Quantico, Va.
Observation Squadron One, U. S. Marine Corps, Santo Domingo, D. R.
Observation Squadron Two, U. S. Marine Corps, Port au Prince, Haiti.
Scouting Squadron One, U. S. Marine Corps, Sumay, Guam, M. I.

STRENGTH OF U. S. AIR FORCES

(ARMY, NAVY, MARINE)

	Officers	*Aviators*	*Students*	*Enlisted Men*	*Totals*
Army (Dec. 31, 1922).....	*61	829	98	8,350	9,338
Navy (Nov. 1, 1922).....	224	295	35	3,866	4,420
Marine (Dec. 1, 1922).....	9	43	8	760	820
	294	1,167	141	12,976	14,578

DIPLOMATIC SERVICE OF THE UNITED STATES

France ..... Maj. C. H. Walsh, Army Air Service, Attaché, Paris.
Germany ..... Maj. Benjamin D. Foulis, Army Air Service, Attaché, Berlin.
Maj. Harold Geiger, Army Air Service, Berlin.
Lt. Comdr. Z. Lansdowne, Naval Air Service, Attaché, Berlin.
Great Britain.. Maj. H. C. Davidson, Army Air Service, Attaché, London.
†Lt. Comdr. N. H. White, Naval Air Service, Attaché, London.
Italy ..... Maj. J. E. Chaney, Army Air Service, Attaché, Rome.
Turkey ..... Maj. A. L. Sneed, Army Air Service, Attaché, Constantinople.

DIPLOMATIC SERVICE TO THE UNITED STATES

France .....Capt. Georges Thenault, Air Attaché, Washington, D. C.
Great Britain..Wing Comdr. M. G. Christie, Air Attaché, Washington, D. C.
Italy .....Col. V. Asinari Di Bernezzo, Acting Air Attaché, Washington, D. C.
Peru .....Capt. Juan Leguia y Swayne, Naval Air Attaché, Washington, D. C.

AERONAUTICAL BOARD

As of December 31, 1922

Munitions Building, Washington, D. C.

(For function, see "Year Book," 1921)

Navy	*Army*
Rear Admiral W. A. Moffett, U. S. N., Chairman.	Maj. Gen. Mason M. Patrick, U. S. A.
Capt. L. M. Overstreet, U. S. N.	Lieut. Col. J. E. Fechet, U. S. A.
Commander J. C. Hunsaker, U. S. N.	Maj. H. A. Dargue, U. S. A.

WORKING COMMITTEE

Lieut. D. S. Seaton, U. S. A., Chairman.

Commander VonK. Coman, U. S. N.	Maj. H. B. S. Burwell, U. S. A.

*Of 61 officers in the Army Air Service, 44 are undergoing flying training. The actual number of non-flying officers is 17.

†Lieut. Comdr. White represents the Naval Air Service at Paris and Rome in addition to his duties in London.

HELIUM BOARD

As of December 31, 1922

Lieut. Col. Ira F. Fravel, U. S. A., Chairman.
Lieut. Comdr. S. M. Kraus, U. S. N.
Dr. R. B. Moore, Bureau of Standards.

Alternates

Capt. R. E. O'Neill, U. S. A.
Lieut. Comm. B. G. Leighton, U. S. N.
Dr. M. S. Milliken, Bureau of Standards

Working Committee

Mr. C. E. Earle, U. S. N.
Mr. J. H. Luening, U. S. A.

The U. S. Helium Production Plant began operating March 28, 1921, and continued until November 30th, when, owing to insufficient funds, it was placed on an inoperative basis. Operations were resumed October 1, 1922, and have been continued to date. The plant up to January 1, 1923, had produced 3,250,000 cubic feet of helium. It was estimated that on that date there was in storage approximately 2,500,000 cubic feet of pure helium and approximately 500,000 cubic feet impure helium, about 60 per cent of which will be recovered and used.

BOARD OF SURVEYS AND MAPS

(Department of the Interior)

The Board of Surveys and Maps is a co-ordinating body and acts as an advisor on matters relating to all kinds of maps published by Government agencies. Two committees act on matters pertaining to maps of aeronautical interest as follows: Committee on Photographic Surveying, whose duties are to investigate and report on matters relating to photographic surveying from aircraft and from the ground; Committee on Aerial Navigation Maps, whose duties are to investigate and report on matters relating to the preparation and publication of navigation maps.

The Personnel of these committees is composed of one representative from each of the following named services:

Committee on Photographic Surveying

International Boundary Commission.
Army Air Service.
Corps of Engineers.
Coast and Geodetic Survey.
Geological Survey.
Bureau of Aeronautics, Navy Dept.

Committee on Aerial Navigation Maps

Army Air Service.
Corps of Engineers.
Coast and Geodetic Survey.
Geological Survey.
Bureau of Aeronautics, Navy Dept.

AIR MAIL SERVICE, POST OFFICE DEPARTMENT

Executives

Col. Paul Henderson.....Second Assistant Postmaster General.
Carl F. Egge.....General Superintendent.
J. W. Sutherin.....Chief Clerk.

Division Superintendents

J. E. Whitbeck, Eastern Division, from New York, N. Y., to Iowa City, Iowa; headquarters, Maywood, Ill.
D. B. Colyer, Central Division, from Iowa City, Iowa, to Rock Springs, Wyo.; headquarters, Omaha, Neb.
A. C. Nelson, Western Division, from Rock Springs, Wyo., to San Francisco, Cal.; headquarters, Salt Lake City, Utah.

Repair Depot and Warehouse

Randolph G. Page, Superintendent, Maywood, Ill.

Air Mail Fields

*New York, N. Y.
*Bellefonte, Pa.
*Cleveland, Ohio.
*Bryan, Ohio.
*Chicago, Ill.
*Iowa City, Iowa.
*Omaha, Neb.
*North Platte, Neb.
*Cheyenne, Wyo.
Rawlins, Wyo.
*Rock Springs, Wyo.
*Salt Lake City, Utah.
*Elko, Nev.
*Reno, Nev.
*San Francisco, Cal.

Transcontinental Controls

Hazelhurst Field, L. I., N. Y.—	
Bellefonte, Pa.	225 miles
Cleveland, Ohio	210 miles
Bryan, Ohio	160 miles
Chicago, Ill.	175 miles
Iowa City, Iowa	195 miles
Omaha, Neb.	230 miles
North Platte, Neb	245 miles
Cheyenne, Wyo.	215 miles
Rawlins, Wyo.	134 miles
Rock Springs, Wyo	106 miles
Salt Lake City, Utah	155 miles
Elko, Nev.	205 miles
Reno, Nev.	235 miles
San Francisco, Cal	190 miles
Total	2680 miles

*Denotes radio station.

Planes in Service

Number of planes on hand January 1, 1923:
- Serviceable 62
- Undergoing repairs 30

Number of Liberty motors:
- Serviceable 189
- Needing overhaul 420

The total value of property owned by the Air Mail Service as of January 1, 1923, was $2,800,000. This includes planes, motors, motor vehicles, all spare parts and material in stock rooms, hangars and other buildings. The buildings, which are leased, are not included in this estimate.

On January 1st, the service had a total of 414 employees, which included 25 supervisors, 40 pilots and 28 radio operators.

CONSOLIDATED STATEMENT OF THE OPERATION AND PERFORMANCE OF THE AIR MAIL SERVICE FOR THE CALENDAR YEAR 1922

For Performance 1918-1921, See Year Book, 1922, Page 214-215

Month	Trips Possible	Trips Attempted	Trips Defaulted	Trips Uncompleted	Weather		Mileage Possible	Miles Traveled with Mail	Ferry and Test	Total Miles Traveled	Per cent of performance	Mail Carried (lbs.)	Cost of Service	Forced Landings	
					Trips in Fog, etc.	Trips Clear								Mechanical	Other Causes
1922															
Jan. ..	699	633	66	32	191	442	136,880	119,966	17,721	137,687	87.64	93,283	$ 116,553.07	31	44
Feb. ..	635	558	77	15	210	348	124,960	107,944	10,140	118,084	86.38	92,902	86,898.29	24	28
Mar. ..	729	690	39	22	269	421	144,720	134,503	16,161	150,664	92.94	123,312	95,884.94	13	57
April ..	675	652	23	16	276	376	134,000	127,634	6,369	134,003	95.25	116,303	80,066.05	17	69
May ..	702	694	8	8	235	459	139,360	136,973	12,312	149,285	98.30	121,888	79,611.22	17	46
June ..	702	697	5	1	161	536	139,360	138,185	9,770	147,955	99.15	132,904	78,480.86	18	9
July ..	675	675	0	2	203	472	134,000	133,809	8,620	142,429	99.86	119,846	90,174.89	11	6
Aug. ..	729	729	0	0	205	524	145,896	145,896	14,485	160,381	100.00	135,036	121,270.00	8	6
Sept. ..	688	686	2	1	187	499	136,562	135,997	10,334	146,331	99.59	154,004	126,075.56	15	13
Oct. ..	706	703	3	9	255	448	139,977	138,307	38,606	176,913	98.80	153,145	341,770.51	22	15
Nov. ..	677	653	24	18	349	304	134,182	127,805	17,029	144,834	95.24	139,828	*100,633.69	20	37
Dec. ..	674	629	45	21	394	235	133,760	123,070	**23,920	146,990	92.01	129,746	**104,000.00	10	37
Total	8291	7999	292	145	2935	5064	1,643,677	1,570,089	185,467	1,755,556	95.52	1,512,197	$1,421,419.08	206	367

*Figures might vary slightly.
**Estimated.

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS
2722 Navy Building, Washington, D. C.

ORGANIZATION

Charles D. Walcott, Sc.D., Chairman
S. W. Stratton, Sc.D., Secretary
Joseph S. Ames, Ph.D., Chairman, Executive Committee

William F. Durand, Ph.D.	Major L. W. McIntosh, U.S.A.
John F. Hayford, C.E.	Rear Admiral W. A. Moffet, U.S.N.
Commander J. C. Hunsaker, U.S.N.	Maj. Gen. Mason M. Patrick, U.S.A.
Charles F. Marvin, M.E.	D. W. Taylor, D.Eng.

Orville Wright, B.S.

Executive Officer, G. W. Lewis
Assistant Secretary, J. F. Victory

SUBCOMMITTEES

Aerodynamics	Governmental Relations
Power Plants for Aircraft	Publications and Intelligence
Personnel, Buildings, and Equipment	Materials for Aircraft

OFFICE OF AERONAUTICAL INTELLIGENCE

Joseph S. Ames, Ph.D., Director

The National Advisory Committee for Aeronautics is charged by law with the supervision and direction of the scientific study of the problems of flight with a view to their practical solution, and the determination of the problems to be attacked. It is authorized to direct and conduct research and experiment in aeronautics in such laboratories as may be placed under its direction. The War Department has set aside a plot of ground at Langley Field, Virginia, for the Committee's use, and Congress has provided funds for the erection by the Committee of the Langley Memorial Aeronautical Laboratory, which now consists of five laboratory buildings, a hangar, and a boiler plant.

The Army and Navy Air Services depend upon the National Advisory Committee for Aeronautics for the scientific study and solution of the more fundamental problems in aeronautics. Chairman Walcott, in a letter to President Harding transmitting the Committee's Eighth Annual Report, stated: "The contributions of the Committee to the science of aerodynamics have during the past year placed America in the forefront of progressive nations in this respect." Technical reports, notes, and memorandums are issued from time to time describing the progress in the science of aeronautics. The great progress made in the physical development of aircraft since the beginning of the World War in 1914 has led Dr. Walcott to make the further statement to the President that "aircraft will prove even more revolutionary than the railroad or the automobile."

The National Advisory Committee for Aeronautics also serves as an advisory committee for the consideration of questions of governmental aeronautical policy. It conducts an Office of Aeronautical Intelligence, which is the official Government depository for scientific and technical reports and data,

and the one agency of the Government for the collection, analysis, classification, and diffusion of technical knowledge on the subject of aeronautics generally. During the past year over 32,000 copies of technical reports and papers were distributed, largely upon application.

In December, 1922, the Committee presented to the Congress, through the President, a national aeronautical policy, as a part of its Eighth Annual Report. In submitting this report to the Congress, President Harding endorsed the policy in the following letter:

"To the Congress of the United States:

"In compliance with the provisions of the act of March 3, 1915, establishing the National Advisory Committee for Aeronautics, I submit herewith the Eighth Annual Report of the Committee for the fiscal year ended June 30, 1922.

"The attention of the Congress is invited to the presentation by the National Advisory Committee for Aeronautics of a national aeronautical policy at the conclusion of its report. The constructive recommendations therein contained for the advancement of aeronautics deserve the thoughtful consideration of all members of the Congress.

"WARREN G. HARDING.

"The White House,
"December 5, 1922."

The national areonautical policy is here reproduced in full:

A NATIONAL AERONAUTICAL POLICY

The committee here presents for the consideration of the President and of the Congress a summary of its views and its more important recommendations, which if acted upon as a whole would constitute an effective national aeronautical policy.

AERONAUTICS AND THE PROGRESS OF CIVILIZATION

Aeronautics, though its development has barely begun, has already exerted a great influence on civilization. Its necessity for military purposes has been definitely established; its adaptation to commercial purposes has just commenced.

No one can safely visualize the future of aeronautics. Its importance in warfare and usefulness in commerce will increase with each passing year. No restrictions were placed on its development for military purposes by the arms conference. This fact alone is sufficient to assure its greater relative importance in future warfare, over both land and sea.

The development of aeronautics in the few years since its first practical introduction has been one of the marvels of our age. The record made by the Air Mail Service during the past year of nearly 2,000,000 miles without a single fatal accident, is the cornerstone of progress for commercial aeronautics. History records that each improvement in the means of transportation and communication between peoples has lightened the burden of man's labors, increased his prosperity, and broadened his knowledge of his fellow man.

The tremendous possibilities that the new science of aeronautics holds for the advancement of the human race can not be realized in a day. Science has only begun to grasp intelligently the fundamental problems involved in

its development. With the help of well-directed scientific research, with the imagination of the people fully aroused, and with comprehensive, helpful legislation enacted, aeronautics will begin to yield, in peaceful pursuits, its real contribution to the progress of civilization.

The Need for Federal and State Legislation

The National Advisory Committee for Aeronautics reiterates its former recommendations that Federal legislation be enacted to provide for the regulation and licensing of aircraft aviators, the establishment of airways and landing fields, and the general development of civil and commercial aviation. For this purpose the committee again strongly recommends the creation by law of a bureau of civil aeronautics in the Department of Commerce.

From many considerations it is necessary that the Federal Government rather than the States should regulate aviation. Uniformity of rules of the air and of all regulations will facilitate the growth of aeronautical activities in all parts of the country.

The committee on a uniform aviation act of the National Conference of Commissioners on Uniform State Laws, after a thorough study of the problem, has recognized the desirability of Federal control and has reached the conclusion that "the Supreme Court of the United States will almost certainly sustain an all-inclusive Federal act for the regulation of aviation." The same committee recommends the enactment of uniform State laws confined to the "elementary principles concerning the lawfulness of flight, the responsibility for damages, and similar matters." The National Advisory Committee for Aeronautics indorses these views and believes that the enactment of comprehensive Federal legislation supplemented by uniform State laws along the lines indicated is not only desirable but essential if America, the birthplace of aviation, is to become foremost in its development.

The Importance of Scientific Research

Substantial progress in the science and art of aeronautics depends primarily upon the continuous acquisition of knowledge. The necessary knowledge can be obtained only by long-continued and well-directed scientific research. The investigation and study of the fundamental phenomena of flight is the definite prescribed function of the National Advisory Committee for Aeronautics. The limited funds and facilities available for research under the committee's direction will slowly yield answers to only the most pressing problems awaiting solution.

Even if civil aeronautical activities were flourishing in all parts of the country and liberal appropriations were made, as they should be, for military and naval aviation, there would be but little, if any, substantial progress in aeronautics unless at the same time the continuous prosecution of scientific research were liberally provided for. This is the most important subject in the whole field of aeronautics. The Army and Navy air services depend upon the Advisory Committee for the scientific study and solution of the more difficult problems. In order that the committee may more effectually aid the advancement of aeronautics and measure up more fully to its own responsibilities, the committee strongly recommends that ample funds and facilities be provided for the complete execution of the research programs that have been approved.

Aviation for National Defense

Aviation has been proven indispensable to both the Army and the Navy. Neither can operate effectively without an adequate air service. What was

considered adequate in the World War will not do in the future. There must be a greater proportion of aircraft of all types, and they must all be of the most modern design. For this latter purpose, the committee emphasizes the need for continuous development. As the types and uses of aircraft for military and naval purposes differ in important particulars, the War and Navy Departments must continue to have charge of aircraft development for their respective services. Appropriations for aviation in the Army and Navy should in the interests of national defense be ample, now and at all times, to provide for continuous development. While it is possible that other and older branches of the two military services may have reached the periods of their greatest development, this is certainly not so with aeronautics.

While public sentiment is demanding reduction of the Army and Navy to a prewar basis, it is the judgment of the National Advisory Committee for Aeronautics that it does not demand that the air services of the Army and Navy be so reduced, nor even that they be reduced proportionately with other branches of the Army and Navy. The novelty of warfare in the air, the lack of civil aeronautical activities upon which to draw in time of need, the rapid developments in aeronautics that are taking place in other countries, the absolute necessity of aviation for national defense, and other factors all combined, have led the people to the support of a policy of progress and development in the aeronautical branches of the Army and Navy, however much they may insist upon the curtailment of other military and naval expenditures.

Helium for Airships

The exclusive possession of helium-bearing gases by the United States is a national asset. The possession of this asset imposes two distinct responsibilities upon the Nation: First, that the method of extraction of helium be improved and the cost thereof lessened, with a view to its use in all future American airships; second, that the limited known supply, now escaping at the rate of 500,000,000 cubic feet per year, or an amount sufficient to fill 250 large airships, be conserved for future use by the American people.

Reliable assurances have been given that with existing knowledge, the present cost of production can be greatly reduced if the extraction of helium were to be undertaken on a production instead of an experimental basis. But, whether or not we now undertake to realize the advantages which the use of helium affords, the committee unqualifiedly recommends that Congress provide for the conservation of existing natural resources, through the acquisition and sealing by the Government of the largest and best helium fields.

The Air Mail Service

The Air Mail Service is the pioneer agency in the world for the successful practical application of aviation to useful pursuits of peace. Originally inaugurated as an experimental laboratory to encourage the development of civil aviation, it has not only been successful in that respect, but is now on the threshold of a wonderful achievement. There is little doubt but that the air mail will soon link our Atlantic and Pacific coasts in 28 or 30 hours' service as a regular performance. Its recent record of more than 12 months' operation in all kinds of weather and over all kinds of country, flying nearly 2,000,000 miles without a single fatality, serves to demonstrate in a forceful manner the safety and utility of airplanes under competent organization and control. In the judgment of the National Advisory Committee for Aeronautics the Air Mail Service is now just beginning to yield the substantial

results for which it was established, and there should now be no question as to the advisability of its continuance.

Aerological Service Along Airways

When transcontinental airways are established it will be necessary for the Weather Bureau to provide aerological service along such airways as they are established. The committee recommends, therefore, that in the consideration of any future legislation for the encouragement of civil aviation adequate provision of law and appropriation be made for the extension of the aerological work of the Weather Bureau, without which there can be no safety in the air nor success in commercial aviation.

Federal Aid Necessary

The increasing relative importance of aircraft in warfare is alone sufficient to justify the expenditure of public funds to aid the development of air navigation on a commercial basis. It has been the history of civilized nations that governments have found it necessary to aid in the development of means of transportation. The wonderful growth of transcontinental railroads in America was greatly aided by land grants from our Government. Progressive European nations are spending large sums, through direct and indirect subsidies, for the promotion of civil and commercial aviation. The practical development of aviation in America will not be realized until the Government gives intelligent support and effective aid, principally by regulating and licensing and by co-operation with the States in the establishment of airways and landing fields.

BUREAU OF FOREIGN AND DOMESTIC COMMERCE AUTOMOTIVE DIVISION

(Department of Commerce)

M. H. Hoepli, Acting Chief

During the calendar year 1922, the Automotive Division of the Bureau of Foreign and Domestic Commerce represented the civil aeronautic interests within the Department of Commerce, pending the establishment of a Bureau of Civil Aeronautics. While the aircraft activities of this division during the past year were largely of an informative character, some promotional work was done along the following lines:

First. The various interests concerned were called together for preliminary discussion of the Winslow Bill.

Second. Contact was established and maintained with foreign representatives of American aircraft manufacturers and through this intermediary as well as the assistance of the foreign officials of the Department of Commerce several opportunities for the sale of equipment were brought to the attention of aircraft manufacturers.

Third. Plans are being laid toward coordinating the efforts of the various interests concerned in the project of the establishment of air lines in Central America.

AIRCRAFT EXPORTS

Exports (U. S.) 1922

	Airplanes		*Airplane Parts*	*Airplane Engines*	
	No.	*Value*	*Value*	*No.*	*Value*
January	1	$5,000	$11,479	3	$5,275
February	....	.....	10,146	1	200
March	23	19,850	3,395	23	6,517
April	1	3,000	1,412	8	9,125
May	1	2,230	11,202	29	8,229
June	....	.....	12,242	29	19,081
July	7	28,300	6,005	3	6,190
August	....	.....	3,238	5	8,200
September	....	.....	16,862	3	900
October	4	98,000	185,205	....	.....
November	5	900	3,393	29	7,800
December	....	.....	817	17	1,400
Total	42	$157,280	$265,396	150	$72,917

Aircraft Exports, 1916-1922, by Countries

Countries	*1916*	*1917*	*1918*	*1919*	*1920*	*1921*	*1922*	*Total 1916-1922*
France	.....	.....	.....	(2) $15,000	(2) $42,600	.....	.....	(4) $57,600
Netherlands	.....	.....	(6) $76,226	.....	.....	.....	.....	(6) 76,226
Norway	.....	.....	.....	(2) 22,000	.....	.....	$3,000	(3) 25,000
Spain	(4) $37,980	.....	.....	.....	.....	.....	.....	(4) 37,980
Sweden	.....	.....	(3) 44,239	.....	.....	.....	.....	(3) 44,239
United Kingdom	(240) 1,964,094	(12) $170,954	(4) 27,775	.....	.....	(2) $10,000	.....	(258) 2,172,823
Canada	(16) 95,046	(102) 616,068	(2) 6,500	(8) 28,200	(5) 27,160	(1) 5,000	(1) 2,230	(135) 780,204
Mexico	.....	.....	.....	.....	(4) 28,000	(15) 98,165	(27) 20,250	(46) 146,415
Nicaragua	.....	.....	.....	.....	.....	(2) 25,000	.....	(2) 25,000
Cuba	.....	.....	.....	(2) 5,000	(2) 15,500	(1) 8,000	(1) 500	(6) 29,000
Jamaica	(1) 875	.....	.....	.....	.....	.....	.....	(1) 875
Argentina	(1) 5,000	.....	.....	.....	(9) 38,050	(19) 79,500	.....	(29) 122,550
Bolivia	.....	.....	.....	.....	(1) 25,180	.....	.....	(1) 25,180
Brazil	(3) 20,000	.....	(2) 34,500	(1) 18,000	(9) 109,000	(1) 1,396	(5) 108,700	(21) 291,596
Colombia	.....	.....	.....	(1) 10,000	(1) 10,100	(1) 5,000	.....	(3) 25,100
Peru	.....	.....	.....	(1) 4,500	(25) 272,750	(2) 5,000	.....	(28) 282,250
Uruguay	.....	.....	.....	.....	.....	.....	(1) 5,000	(1) 5,000

AIRCRAFT EXPORTS, 1916-1922, BY COUNTRIES—*Continued*

Countries	*1916*	*1917*	*1918*	*1919*	*1920*	*1921*	*1922*	*Total 1916-1922*
China	.....	.....	.....	.....	(5)		(6)	(11)
	.....	.....	.....	.....	20,220	.....	17,600	37,820
Dutch East Indies	(2)	(12)						(14)
	27,000	145,000	.....	.....	.....	.....	.....	172,000
Hongkong	.....	.....	.....	.....	.....	(1)	.....	(1)
	.....	.....	.....	.....	.....	1,800	.....	1,800
Japan	(2)	(7)	(3)		(1)	(1)		(14)
	8,400	52,520	16,880	.....	5,714	15,000	.....	98,514
Australia	.....	(1)	.....	(2)				(4)
	.....	17,000	.....	20,000	.....	.....	.....	37,000
Philippine Islands	.....	.....	.....	(25)	(1)	(2)		(28)
	.....	.....	.....	92,600	4,000	61,079	.....	157,679
TOTALS	(269)	(135)	(20)	(44)	(65)	(48)	(42)	(623)
	$2,158,395	$1,001,542	$206,120	$215,300	$598,274	$314,940	$157,280	$4,651,851
Parts of Airplanes	$4,843,610	$3,133,903	$8,877,977	$3,249,226	$554,375	$157,608	$265,231	$21,081,930

AIRCRAFT APPROPRIATIONS (UNITED STATES)

See Aircraft Year Book, 1921, p. 179

1923-24

	Estimates of the Director of the Budget	*Actual Appropriation of Congress*	*Decrease*
Air Mail	$ 1,500,000	$ 1,500,000	.....
Army Air Service	12,671,300	*12,426,000	$245,300
Bureau of Aeronautics (Navy)	14,673,950	*14,647,174	26,776
National Advisory Committee for Aeronautics	260,000	270,000	.....

Comparison of 1922, 1923 and 1924 Appropriations

	1921-1922	*1922-1923*	*1923-1924*
Air Mail	$ 1,250,000	$ 1,900,000	$ 1,500,000
Army Air Service	19,200,000	12,700,000	12,426,000
Bureau of Aeronautics (Navy)	13,413,431	14,683,590	14,647,174
National Advisory Committee for Aeronautics	200,000	210,000	270,000

*Includes an appropriation of $500,000 for Helium experimentation.

The amount allowed for the purchase and production of aircraft and equipment for the Army Air Service is $2,646,000—for the Navy Air Service (Bureau of Aeronautics) $5,798,950.

APPROPRIATIONS (FOREIGN)

1922

For previous years see Aircraft Year Book, 1921, pp. 178, 197

	Total	*Civil Aviation*	*Subsidies*
Algiers	.....	.....	1,000,000 francs
Argentina	$964,800	.....	.....
Australia	.....	.....	£37,600
Belgium	28,200,000 francs	10,000,000 francs	3,000,000 francs
Canada	$1,600,000	.....	.....
Czecho-Slovakia	9,080,000 kr.	.....	6,000,000 kr.
Finland	15,000,000 Finnish marks	.....	.....
France	438,299,252 francs	147,210,970 francs	45,382,000 francs
Germany	.....	.....	22,000,000 marks
Great Britain	£11,210,291	£364,000	£200,000
Italy	70,000,000 lire	25,000,000 lire	.....
Japan	$21,600,000	.....	30,000 yen
Netherlands	3,113,716 fl.	813,300 fl.	325,000 fl.
Spain	$7,456,000	.....	$235,000
Sweden	36,000 kr.	.....	.....
Switzerland	.....	.....	150,000 francs

AIRCRAFT CARRIERS

1922

	United States	*Great Britain*	*Japan*
1st line	2	1	0
2d line	1	5	3
	3	6	3

U. S.	*Tonnage*	†*Great Britain*	*Tonnage*	*Japan*	*Tonnage*
Langley	19,360	Argus	14,450	‡Hosho	9,500
‡Lexington	43,500	Pegasus	3,300	‡Amagi	26,500
‡Saratoga	43,500	§Ark Royal	1,450	‡Akagi	26,500
		‡Furious	22,900		
		‡Hermes	10,950		
		‡Eagle	22,790		
		*Vindicative	9,750		

* This ship not officially rated as an "aircraft carrier" but as a light cruiser fitted as an "Aircraft carrier." Intended that at some future date, she will be reconverted to a light cruiser.

† Great Britain has 17 battleships—4 battle cruisers—7 light cruisers fitted with flying platforms.

‡ Under construction.

§ In reserve.

COST OF OUR WARTIME AIRCRAFT

By MAJOR GEN. MASON M. PATRICK

Chief of Air Service, United States Army

[Reprinted by permission of N. Y. Times Current History Magazine for February, 1923]

The real facts about the expenditure by the United States during the war for aeronautics—The Chief of the United States Air Service officially demonstrates that these expenditures were within one-fourth of total reported.

Prior to our entry into the World War much had been heard of the exploits of the airmen with the allied and German armies. Our imagination had been fired by the accounts of their daring. The Lafayette Squadron, composed of Americans, was winning great glory, and its name became almost a household word in the United States. We read thrilling stories of how these pilots, armed first with ordinary shotguns, then with rifles, later with machine guns attached to their airplanes, went on their dangerous missions and engaged in individual combats with opposing pilots in the skies. We remembered, also, that it was two American brothers who first demonstrated that it was possible for man to fly, and it was easy to make ourselves believe that, when we did enter the war, our American "push" and energy, our American genius, would enable us to send to the battle-front vast numbers of aircraft, better probably than others had been able to produce.

Congress, moved by the demand of the people for a vigorous aircraft program, appropriated vast sums of money, and when the war was ended, and it was known that we had actually sent to France less than 2,000 airplanes, and these the slower two-seater, observation planes, and not a single one of the faster combat, fighting, so-called pursuit, planes, there was great indignation, and a violent outcry that, for a billion or more dollars spent, we had nothing to show in the way of accomplishment.

All those who had to do with the aircraft program came in for scathing criticism, and then followed the searching investigation conducted by Mr. Hughes, which went thoroughly into every phase of the matter.

Probably to the surprise of many, the results of this inqury were almost nil. There was no evidence of any misappropriation of money. Except in a very few cases, none of those who were responsible for the effort to "put the United States into the air," were subjected to severe censure.

So far there has not been published any clear statement of the amount actually expended by the United States for areonautics, nor any detailed explanation of what return was received for the money spent. The figures which follow have been taken from the books of the Treasury and from the records of the Army Air Service.

To start with, it is known that Congress appropriated for army aeronautics from April 7, 1917, to June 30, 1919, the total sum of $1,691,854,758. This figure, often quoted, represents in the minds of many people the *expenditure* which they think was actually made.

It should first be pointed out, however, that at the beginning of the war,

what there was of an Air Service in the army was part of the Signal Corps. A portion of the sum given above, or, to be exact, $42,759,552.71, was expended for Signal Corps activities entirely apart from aeronautics and not properly chargeable thereto.

Other considerable deductions must be made, as shown by the items listed below:

When the war ended there was still a large balance available, and by Congressional action $490,515,060.14 of this balance reverted to the Treasury.

Of the aircraft materials originally purchased by the United States for its own use, some were sold to the Allies, and the amounts paid, or to be paid therefor, aggregated $91,934,187.71, which likewise will revert to the Treasury.

After the war, materials of all kinds, which had cost $105,827,698.67, were transferred by the War Department to other branches of the Government which could use them in their peace-time activities.

From the sale of surplus material there has already been realized the sum of $28,188,057.64; material still to be sold will bring into the Treasury, it is estimated, about $408,433.74, or a total of $28,596,491.38.

Refunds in the sum of $2,945,785.06 on account of sales of supplies and war credit advances to contractors during the life of their war contracts have been collected and credited back to the Treasury Department.

Land and buildings also purchased from the appropriation for aeronautics, but now no longer needed by the Air Service, are being placed upon the market, and their sale value is approximately $7,718,944.

From this same appropriation the sum of $21,500,000 was advanced to the Spruce Production Corporation. Every dollar of this is being returned to the Treasury, as the affairs of the corporation are being liquidated.

It is claimed by the United States that the sum of not less than $40,000,000 is due from contractors who were overpaid, and steps to recover are being taken. This needs a word of explanation. No charges of graft or fraud are made in explanation of these overpayments. When the war suddenly came to a close, there were many contractors engaged in manufacturing aeronautical material. The work was stopped at once. There was an earnest desire to have these contractors turn their energies to peace-time production. This they could not do until some kind of a settlement was made with them by the United States. Many of the contracts were very much involved. It was evident that much time would be needed to effect absolutely accurate settlements. All the contracts contained a provision requiring the contractor to preserve his records for some years, and giving the United States access to them. It has taken over a year to make an audit of these contracts. Rather than suffer this long delay, during which these concerns would have had to remain idle while the audit was in progress, a hasty settlement was made with them, and they actually did start promptly to manufacture other than war materials. It was plainly understood by the United States that these settlements were not final. As soon as possible the audits were undertaken, and the concrete result is as stated above, the overpayments aggregating some $40,000,000. Three of the contractors have already returned to the United States the amounts overpaid them.

During the period from June 30, 1919, to June 30, 1921, unexpended balances in the sum of $290,479,474.98 reverted to the surplus fund of the Treasury Department by limitation of law.

Reduced to tabular form, the cost to the United States of the wartime aeronautic effort resolves itself as follows:

Total amount appropriated by Congress for war purposes	$1,691,854,758.00
Expenditures by Signal Corps proper	42,759,552.71
	$1,649,095,205.29
Revocation by act of Congress	490,515,060.14
	$1,158,580,145.15
Actual sales value to foreign Governments	91,934,187.71
	$1,066,645,957.44
Cost value of supplies and equipment transferred to other departments and bureaus	105,827,698.67
	$960,818,258.77
Sales value of surplus supplies equipment sold in United States	28,596,491.38
	$932,221,767.39
Refunds account sale supplies and war credit advances to contractors	2,945,785.06
	$929,275,982.33
Estimated sales value of stations abandoned	7,718,944.00
	$921,557,038.33
Refund account of advance to Spruce Production Corporation	21,500,000.00
	$900,057,038.33
Estimated recovery account overpayment war contracts	40,000,000.00
	$860,057,033.33
Unexpended balance expiring by limitations of law	290,479,474.98
	$569,577,563.35

It will be noted that, with the exception of two items, all the figures in the above table are taken from the records and are exact. The two "estimated" items are believed to be close approximations to the amounts which will be realized. Accepting them as they stand, the total net expenditure for aeronautics is therefore $569,577,563.35, a large sum, but only about one-third of the total amount appropriated by Congress, the "more than a billion and a half dollars" which many of our people believe was spent for aircraft and engines, with nothing to show for it.

It may be worth while to analyze this expenditure briefly. Every dollar of the total of $569,577,563.35 can be accounted for. Though it was all spent for aeronautics, in the effort to place a well-equipped, efficient air force with our army in France, it is a fact that a very large part of this sum was necessarily expended for other things than aircraft and engines.

With it were purchased and leased flying fields in many parts of the

United States, and the necessary buildings were placed thereon. Clothing for aviators, airplane instruments and accessories, motor vehicles, gasoline and lubricants, observation balloons and gas with which to inflate them, training planes and engines, and innumerable other items accounted for still more of these millions.

The perfection of the Liberty engine was the greatest aviation achievement of the United States during the war. All told, 17,368 of these engines were produced by December 31, 1918. Of this total, 4,511 engines, in addition to those installed in the planes shipped to France, were sent to the Army Air Service over there. The navy was given 3,742 and some went to the English, French and Italians, all of whom urgently desired to obtain large numbers of them after their excellence had been proved.

Our own Air Service has continued to use these Liberty engines since the war, and none has yet been developed which is their superior. On July 1, 1922, the Air Service had on hand 11,167 of these engines, and will continue to use them for some years to come. The known present-day cost of an engine which may be classed with the Liberty is $9,500 each. Valuing the Liberty engines at $7,500 each, the number on hand represents $83,752,500.

The estimated value of other property still in the hands of the Air Service, such as the flying fields and depots now occupied, the buildings thereon after allowing for deterioration, instruments, armament and accessories for aircraft of the more than 150,000 items carried by the Supply Division of the Air Service, aggregate $103,693,949.85. Adding the values of these assets, we must deduct $187,446,449.85 from the last figure shown in the table above, leaving $382,131,113.50, this remainder being the actual net cost of our wartime aviation effort, and coming well within one-quarter of the original appropriation.

AIR LAW SECTION
H. R. 13715

67TH CONGRESS, 4TH SESSION

IN THE HOUSE OF REPRESENTATIVES

JANUARY 8, 1923

MR. WINSLOW introduced the following bill; which was referred to the Committee on Interstate and Foreign Commerce and ordered to be printed.

A BILL .

To create a Bureau of Civil Aeronautics in the Department of Commerce, encourage and regulate the navigation of civil aircraft, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

TITLE I.—SHORT TITLE AND DEFINITIONS

SHORT TITLE

SECTION 1. This Act may be cited as the "Civil Aeronautics Acts of 1923."

GENERAL DEFINITIONS

SEC. 2. As used in this Act, except Title IV—

(a) The term "Secretary" means the Secretary of Commerce.

(b) The term "Commissioner" means the Commissioner of the Bureau of Civil Aeronautics.

(c) The term "Bureau" means the Bureau of Civil Aeronautics and includes the field service thereof.

(d) The term "United States," when used in a geographical sense, means the territory comprising the several States, Territories, possessions, and the District of Columbia and the Canal Zone (including the territorial waters thereof), and the airspace above such territory. This definition shall not apply to part 5 of Title II relating to the report, entry, and clearance of aircraft.

(e) The term "aircraft" means any contrivance now known or hereafter invented, used or designed for navigation of, or flight in, the air, except a parachute or other contrivance designed for such navigation but used primarily as safety equipment.

(f) The term "public aircraft" means (1) an aircraft navigated by the military or naval forces, including the Coast Guard, or the Air Mail Service of the United States, or by the Advisory Committee for Aeronautics, (2) or a Government aircraft used exclusively in the public service of a foreign country.

(g) The term "civil aircraft" means any aircraft other than a public aircraft.

(h) The term "aircraft of the United States" means any civil aircraft registered or exempt from registration in accordance with the provisions of Title II, or any public aircraft owned by the United States.

(i) The term "person" means individual, partnership, association, or corporation.

(j) The term "airdrome" means any area or supporting surface, including structures anchored thereto or floating thereon, used or purposely adapted for the storage, maintenance, or repair of aircraft navigated by individuals who are on board the craft; except any such area or structure which is not operated for profit and which is used by the owner or tenant solely for the storage, maintenance, or repair of aircraft exclusively for the personal use of himself, his family, and guests.

(k) The term "air navigation facility" includes any airdrome, emergency landing field, air signal structure, or aerial beacon in the United States.

(l) The term "civil air navigation facility" means any air navigation facility except one operated by the military or naval forces of the United States, including the Coast Guard, or by the Advisory Committee for Aeronautics.

(m) The term "master" means the individual having command of an aircraft.

(n) The term "airman" means any individual (including the master and any pilot, mechanic, or member of the crew) engaged in the navigation of aircraft while under way, and any ground engineer engaged in the inspection, overhauling, or repairing of aircraft.

(o) The term "domestic corporation" means an association or corporation created or organized in the United States.

Definitions of Citizen of the United States

SEC. 3. When used in this Act, except Title IV, the term "citizen of the United States" means (a) the United States, any State, Territory, or possession, or the District of Columbia, or the Canal Zone, or any political subdivision thereof, (b) any association or corporation directed by Act of Congress to act as a governmental agency, (c) an individual who is a citizen of the United States or its possessions, (d) a partnership of which each member is an individual citizen of the United States or its possessions, or (e) a domestic corporation, of which the president and three-fourths or more of the board of directors or managing officers thereof, as the case may be, are individual citizens of the United States or its possessions and in which at least 75 per centum of the interest is owned by persons who are citizens of the United States.

SEC. 4. Seventy-five per centum of the interest in a domestic corporation shall not be deemed to be owned by persons who are citizens of the United States within the meaning of clause (e) of section 3—(a) unless 75 per centum of the stock of such corporation is vested in such persons free from any trust or fiduciary obligation in favor of any person not a citizen of the United States; or (b) unless 75 per centum of the voting power in the corporation is vested in persons who are citizens of the United States; or (c) if there is any contract or understanding providing that more than 25 per centum of the voting power in the corporation may be exercised, directly or indirectly, on behalf of any person who is not a citizen of the United States; or (d) if the

control of any interest in the corporation in excess of 25 per centum is by any other means conferred upon or permitted to be exercised by any person who is not a citizen of the United States.

SEC. 5. If, in applying sections 3 and 4 to the case of a domestic corporation, it appears that any interest therein is owned by another corporation or association, the citizenship of the second corporation or association shall be determined under the provisions of sections 3 and 4, and the same rule shall, for the purposes of this Act, be successively applied in any case of ownership by a corporation or association of interest in another.

TITLE II—DOMESTIC AIR NAVIGATION

PART 1—BUREAU OF CIVIL AERONAUTICS

ESTABLISHMENT OF BUREAU

SEC. 201. The Secretary shall encourage, foster, and promote civil aeronautics in every possible manner, and do all things necessary therefor. For such purposes there is established in the Department of Commerce a bureau to be known as the Bureau of Civil Aeronautics under the direction of a Commissioner of Civil Aeronautics, who shall be appointed by the President, by and with the advice and consent of the Senate, and who shall receive a salary of $7,500 per annum. Except as otherwise specifically provided, the administration of all functions authorized by Title II or III of this Act, or by regulations of the Secretary made thereunder, is vested in the Commissioner under the supervision of the Secretary.

GENERAL POWERS OF SECRETARY

SEC. 202. The Secretary is authorized—

(a) In accordance with the civil service laws, to appoint in the Bureau and fix the compensation of, an Assistant Commissioner of Aeronautics, a chief clerk, and such other officers and employees as may from time to time be required for the purposes of this title and of Title III and be provided for by the Congress. The Assistant Commissioner shall perform such duties as the Secretary may prescribe, and during the absence or incapacity of the Commissioner, or during a vacancy in the office of the Commissioner, the Assistant Commissioner shall act as Commissioner;

(b) In accordance with the civil service laws, to appoint in the office of the Solicitor of the Department of Commerce, and fix the compensation of, three attorneys and such additional law clerks as may from time to time be required for the purposes of this title and be provided for by the Congress. The compensation of such attorneys and law clerks shall be paid out of the appropriations made for the administration of the functions vested by this Act in the Secretary or in the Bureau;

(c) To make such regulations as are necessary to execute the functions vested in him or in the Bureau or in the Commissioner by this Act.

GENERAL POWERS OF COMMISSIONER

SEC. 203. The Commissioner, with the approval of the Secretary, is authorized—

(a) To make such expenditures authorized by law (including salaries, travel, per diem rates of allowance in lieu of subsistence, the purchase, mainte-

nance, operation, and repair of aircraft and facilities thereof, printing and binding, law books, books of reference, periodicals, rent, and contingent and miscellaneous expenses) as may be necessary efficiently to execute the functions authorized by Titles II and III and as may be provided for by the Congress from time to time;

(b) To publish from time to time a bulletin setting forth all licenses and permits issued or revoked under the provisions of this Act, together with field reports of all civil aeronautic activities, accidents, field and route data, and such other matters relating to the functions authorized by this Act as he deems advisable; and

(c) To publish the treaties and laws of the United States relating to civil aeronautics and regulations issued thereunder, and collect and publish at least annually in the bulletin provided for in subdivision (b), all important court and administrative decisions in respect of such treaties, laws, and regulations, together with an index-digest thereof cumulated from time to time.

REPORTS

SEC. 204. The Commissioner shall report to the Secretary annually at the close of each fiscal year and make such other reports as the Secretary may require. In the annual report the Commissioner shall give an account of all moneys received and expenditures made by the Bureau, and describe the work done by the Bureau. The Secretary shall transmit such report to the Congress with the annual report of the Department of Commerce.

DETAIL OF ARMY, NAVY, AND COAST GUARD OFFICERS

SEC. 205. (a) The Secretary of Commerce may, whenever in his judgment he deems it advisable, request the Secretary of War, the Secretary of the Navy, or the Secretary of the Treasury to detail officers from the Air Service, the Air Service Officers' Reserve Corps, or the Office of the Chief of Air Service of the War Department, or from the Bureau of Aeronautics of the Navy Department or class 5 of the United States Naval Reserve Force, or from the Coast Guard in the Treasury Department, respectively, for service in the Bureau of Civil Aeronautics. If such request is complied with any officer so detailed shall be subject to the direction and control of the Secretary of Commerce in carrying on the service for which he is detailed. No officer shall, by reason of such detail, suffer any loss in military or naval grade, rank, or status.

(b) If the salary for the position in the Bureau to which the officer is detailed is greater than the pay to which he is entitled by reason of his military or naval grade, rank, and status, then the officer shall, in addition to such pay, be paid from the appropriation for the salary of such position the difference between such salary and pay. If the salary for the position in the Bureau to which the officer is detailed is less than the pay to which he is entitled by reason of his military or naval grade, rank, and status, then the officer shall be entitled to such pay, but not to the salary for the position in the Bureau to which he is detailed.

(c) Nothing in this Act shall be construed to reduce the pay of any officer detailed to the Bureau under this section to an amount less than that to which he is entitled in the service from which he is detailed; and detail to duty under the Bureau shall be regarded as detail to duty involving flying.

(d) As used in this section, the term "pay" means pay and allowances, including increase in pay and allowances for officers detailed to duty involving flying.

SEC. 206. The Commissioner is authorized—

(1) To make from time to time studies for the development of civil aeronautics in the United States, and to collect and disseminate information relative thereto;

(2) To make from time to time comprehensive surveys and inventories of all civil aeronautical resources within the United States; and

(3) To investigate, record, and make public from time to time the causes of accidents in civil aeronautics in the United States.

TEMPORARY APPROPRIATION

SEC. 207. For expenses in the administration of the functions vested in the Secretary or the Commissioner by this Act, there is hereby authorized to be appropriated the sum of $375,000 to be available for such expenses incurred prior to July 1, 1924.

PART 2—AIRCRAFT OF THE UNITED STATES

SCOPE OF REGULATIONS

SEC. 221. Inasmuch as air navigation is a unit and does not regard State lines, and the elements thereof ordinarily subject to regulation by the States are so mingled with those elements subject to regulation by the Federal Government, that the Federal Government can not effectively regulate, prevent interference with, and safeguard interstate and foreign commerce by air navigation without incidental regulation of intrastate commerce by air navigation and of air navigation for other than commercial purposes, the provisions of this title shall apply in respect of all air navigation in the United States, and to aircraft and airmen engaged, and to air navigation facilities used, in such navigation.

REGISTRATION

SEC. 222. (a) The Secretary shall by regulation provide for the registration of aircraft as civil aircraft of the United States; but no aircraft shall be so registered unless (1) it is not registered under the laws of any foreign country, and (2) it is a civil aircraft owned by a citizen of the United States. Any aircraft registered shall be issued a certificate of registry.

(b) No aircraft shall at any time be held a civil aircraft of the United States unless at such time the aircraft is registered in accordance with the provisions of this title or unless it is exempt from such registration by regulation of the Secretary made under the provisions of section 226.

IDENTIFICATION

SEC. 223. The Secretary is authorized by regulation to provide for the identification and marking of civil aircraft in the United States.

SAFETY INSPECTION AND REGULATION OF AIRCRAFT AND AIRMEN IN THE UNITED STATES

SEC. 224. In order to safeguard life and property and protect air commerce and navigation, but for no other purpose, the Secretary is authorized by regulation to—

(a) Publish for the information of the aircraft industry standards of design, construction, repair, maintenance, and equipment, including safety and

signal equipment and accommodations for crew, passengers, and merchandise, for civil aircraft and air navigation facilities.

(b) Provide for the inspection and testing from time to time of civil aircraft in the United States, as to their airworthiness. Civil aircraft found upon such inspection and test to be airworthy shall be issued a certificate of airworthiness.

(c) Provide for the inspection and testing from time to time of civil air navigation facilities in the United States, as to their suitability for safe and efficient use by aircraft. Civil air navigation facilities found upon such inspection and testing to be suited for such use shall be issued an air service certificate.

(d) Provide for the navigation of aircraft in the United States rules of the air, including rules for taking off and alighting; signals for the conduct and protection of air navigation in the United States, including signals for land and water structures, air routes, and air navigation facilities; rules as to safe altitudes of flight, the use of ballast, the use of balloon gases, and the operation of anchored aircraft in the United States; rules for the navigation of aircraft upon waters within the United States; and rules for the prevention of collisions between vessels and aircraft upon such waters.

(e) Provide for the examination and determination of the qualifications of individuals to serve as airmen upon or in connection with civil aircraft in the United States. Such examination shall be based upon the character, physical fitness, training, and practical experience of the airman. Any individual found, upon such examination, to be qualified shall be issued an airman's certificate.

(f) Provide for the maintenance of log books for civil aircraft in the United States.

Unlawful Navigation of Aircraft

Sec. 225. Except as provided in section 226—

(a) No civil aircraft shall be navigated in the United States by any person unless (1) it is a civil aircraft of the United States and (2) it is identified and marked as required by the provisions of this title and regulations thereunder.

(b) No person shall, in the United States—

(1) Navigate any civil aircraft unless there is in force in respect of it a valid certificate of airworthiness;

(2) Operate any civil air navigation facility unless there is in force in respect of it a valid air service certificate; nor

(3) Navigate any aircraft unless such aircraft and its navigation complies with the navigation rules and signals established under section 224 and regulations thereunder.

(c) No individual shall serve in the United States as an airman upon or in connection with any civil aircraft, unless he has in force a valid airman's certificate.

(d) No person shall fail to maintain, or to make any entry in, any log book, as required by the provisions of this title and regulations thereunder.

(e) No owner of any land or water structure or operator of any air navigation facility in the United States shall fail to provide any signal for such structure or facility required by the provisions of this title and regulations thereunder.

(f) No vessel shall be navigated in the United States in violation of

any rule for the prevention of collisions between vessels and aircraft made under the provisions of section 224.

EXEMPTION FROM REGULATION

SEC. 226. (a) Anchored aerostats and aircraft owned by a citizen of the United States and not navigated by any individual on board thereof, and airdromes used solely for such aircraft, may be exempted from the requirements of this part of this title to such extent as the Secretary deems advisable, but the owner of any such aircraft may, upon request and compliance with section 222 and regulations thereunder, have the aircraft registered as a civil aircraft of the United States.

(b) The provisions of subdivisions (a), (b), (c), and (d) of section 225 shall not apply to aircraft or air navigation facilities used solely for experimental, scientific, or signaling purposes, and operated and maintained under such conditions as the Secretary may by regulation prescribe, nor apply to airmen upon any such aircraft.

(c) The provisions of clauses (1) and (2) of subdivision (b) of section 225 shall not apply to aircraft or air navigation facilities while being inspected and tested in accordance with the regulations issued under this title.

(d) The provisions of subdivisions (a), (b), and (c) of section 225 shall not apply to any aircraft while in the custody of any officer or employee of the United States in pursuance of its summary seizure or seizure under process of arrest, for violation of law.

(e) The provisions of clause (3) of subdivision (b) of section 225 shall not apply to aircraft of the military or naval forces of the United States, including the Coast Guard, during any time when the United States is at war or during any national emergency, as declared by proclamation of the President.

(f) The provisions of clause (1) of subdivision (a) of section 225 shall not apply to civil aircraft owned by persons other than citizens of the United States.

(g) The provisions of clause (2) of subdivision (a) and clause (1) of subdivision (b) of section 225 and the provisions of subdivisions (c) and (d) of such section shall not apply to aircraft owned by a citizen or subject of a foreign country, nor to airmen serving on or in connection with such aircraft, if and to the extent that the Secretary finds, and has by regulation declared, that such foreign country has laws approximately equivalent to such provisions in the effectiveness of their terms and administration, and that such aircraft and airmen comply with such laws, except that (1) the Secretary may make such inspection as he deems advisable in order to determine whether any such aircraft or airmen comply with such laws, and (2) no such exemption shall be accorded in respect of an aircraft owned by a citizen or subject of any foreign country, or in respect of airmen serving on or in connection therewith, if the Secretary finds that such country either does not extend a similar exemption to aircraft of the United States, and airmen serving on or in connection therewith, or makes any unfair discrimination against aircraft or airmen of the United States in favor of the aircraft or airmen of such foreign country or any other foreign country.

SEC. 227. Regulations made and certificates issued under this Act may provide for such reasonable classifications and distinctions as to their application (including temporary airman's certificates for cadet airmen in training), as the Secretary deems advisable.

PART 3—ESTABLISHMENT OF AIR ROUTES AND AIR NAVIGATION FACILITIES

SEC. 231. The Secretary is authorized to designate and approve air routes suitable for air commerce in the United States. The Secretary is further authorized, within the limits of appropriations hereafter made by the Congress, (1) to establish, construct, repair, maintain, equip, and operate air navigation facilities upon any such route, whenever he finds that the existing air navigation facilities upon such route are inadequate for the air commerce using the route, and (2) to repair, maintain, equip, and operate air navigation facilities established or constructed by any State, Territory, or possession, or by any municipality or other political subdivision thereof, and dedicated to the United States for public use.

SEC. 232. The Secretary is authorized to prepare and publish maps of air routes designated and approved by him under section 231.

SEC. 233. Air navigation facilities established by the Secretary shall be made available for public use and air navigation facilities under the jurisdiction of the head of any other Government establishment may be made available for public use, under such conditions and to such extent as the Secretary or the head of such Government establishment, respectively, deems advisable and may by regulation prescribe. The United States shall not be liable for any injury to aircraft occurring while the aircraft is making use of any air navigation facility under the jurisdiction of the head of any Government establishment but not established by the Secretary under this part of this title.

SEC. 234. The head of any Government establishment having jurisdiction over any airdrome, may, when necessary to the continuance of air navigation, sell to any aircraft alighting at the airdrome, fuel, oil, equipment, and supplies, and furnish it mechanical service, temporary shelter, and other assistance, under such regulations as the head of the Government establishment may prescribe, if, and only if, such action is, by reason of any emergency, necessary to the continuance of such aircraft on its course to the nearest airdrome established by private enterprise. All such articles shall be sold and such assistance furnished at their fair market value. The amount of the profit from the sale of fuel, oil, equipment, and supplies, or from the furnishing of mechanical services, temporary shelter, or other assistance shall be covered into the Treasury as miscellaneous receipts; but the amount expended from any appropriation for the cost thereof shall be covered into the Treasury to be credited to the amount of such appropriation.

PART 4—AIRSPACE RESERVATIONS

SEC. 241. (a) The President is authorized by Executive order to prescribe airspace reservations in any part of the United States for national defense or other governmental purposes, and in the District of Columbia or the Territories, for public-safety purposes. Aircraft of classes specified in the order shall be prohibited from navigating, or be permitted to navigate through such airspace reservations only under such conditions as the President may prescribe.

SEC. 242. The President may, by Executive order, prescribe such regulations as to (1) warning signals for the location of airspace reservations, (2) conditions to be complied with in case of flight, by reason of distress or other cause, in an airspace reservation, or in case of forced landing upon

any surface area protected by the airspace reservation, and (3) such other matters necessary to the administration of the provisions of this part of this title as he deems advisable.

PART 5—REPORT, ENTRY, AND CLEARANCE OF AIRCRAFT

SEC. 251. When used in this part of this title—

(a) The term "United States" means the territory comprising the several States, Territories, and possessions (except the Philippine Islands, the Virgin Islands, and the islands of Guam and Tutuila) and the District of Columbia, including the territorial waters thereof and the airspace above such territory.

(b) The term "merchandise" means goods, wares, and chattels of every description and includes merchandise the importation of which is prohibited.

(c) The term "aircraft stores" means fuel, oil, equipment, and supplies of an aircraft, reasonably necessary and intended solely for use on such aircraft.

(d) The term "forced landing" means a landing shown, under regulations prescribed by the Secretary, to the satisfaction of an officer of the Bureau of Civil Aeronautics designated by the Secretary, to have been forced by accident, stress of weather, or other necessity.

(e) The term "port of entry for aircraft" means a port of entry designated by the Secretary of the Treasury under section 252.

SEC. 252. Notwithstanding the limitations of law upon the number of ports of entry, the Secretary of the Treasury shall designate airdromes, from among those operated by the military or naval forces of the United States or having valid air service certificates, as ports of entry for civil aircraft.

SEC. 253. Except as provided in section 254, the master of every civil aircraft arriving in the United States from a place outside the United States shall make entry at a port of entry for aircraft, and no civil aircraft shall depart from a place in the United States for any place outside the United States, unless it has received clearance at such a port.

SEC. 254. The Secretary is authorized to permit the arrival without entry and the departure without clearance of the following:

(a) Civil aircraft carrying mail or dispatches and not carrying passengers, baggage, or merchandise (other than such mail or dispatches or aircraft stores).

(b) Civil aircraft carrying passengers, merchandise, or baggage and making three or more trips a week between a port of entry for aircraft and a place outside the United States, but the Secretary may require any such aircraft to make entry and to clear at such times as he deems necessary.

(c) Civil aircraft not permitted by law to carry and not carrying passengers, baggage, or merchandise (other than aircraft stores).

(d) Civil aircraft making a forced landing, if passengers are not taken on board or discharged, and baggage or merchandise (other than aircraft stores) is not laden or unladen, and such aircraft departs within 24 hours after arrival.

(e) Civil aircraft proceeding from a foreign place to a foreign place and not alighting in the United States and not taking on board or discharging passengers or lading or unlading merchandise or baggage in the United States.

SEC. 255. (a) The Secretary shall prescribe regulations for the report and entry of civil aircraft arriving in the United States from a place outside the United States, and for the clearance of civil aircraft departing from any

place in the United States for any place outside the United States, including the case of forced landing at a place other than a port of entry for aircraft, and including the report, entry, and clearance of a civil aircraft proceeding from a foreign place to another foreign place which makes a forced landing in the United States.

(b) The Secretary is authorized to require as a condition of the entry or the grant of clearance to an aircraft, the filing of such statements under oath and the delivery of such documents as he may deem necessary, including upon entry the register or document in lieu thereof and the bill of health, and upon clearance an outward manifest in such form as he may prescribe. The register or document in lieu thereof delivered upon entry shall be returned, upon grant of clearance, to the master of the aircraft.

SEC. 256. The Secretary of War, the Secretary of the Navy, the Secretary of the Treasury, and the Secretary of Commerce shall jointly prescribe regulations, in such cases as they deem necessary, for the report, entry, and clearance of aircraft operated by the military or naval forces of the United States, including the Coast Guard.

SEC. 257. Except in case of a forced landing, a civil aircraft arriving in the United States from a place outside the United States shall first alight at a port of entry for aircraft, and an aircraft departing from any place in the United States for any place outside the United States shall last take off from such a port.

PART 6—ADMINISTRATIVE PROVISIONS

INVESTIGATIVE POWERS

SEC. 261. (a) For the efficient administration of the functions vested in the Secretary or the Commissioner by this title (except the functions vested by part 1 thereof and by subdivision (a) of section 224), the Commissioner, or any officer or employee of the Bureau specifically designated in writing by the Secretary for the purpose, may administer oaths, examine any witness, and require by subpœna issued and signed by the Commissioner or by any such officer (1) the attendance of any witness and production of any book, paper, document, or other evidence from any place in the United States at any designated place of hearing, (2) the taking of a deposition before any designated individual having power to administer oaths, and (3) the answer in writing under oath to any question of fact submitted. In the case of a deposition the testimony shall be reduced to writing by the individual taking the deposition or under his direction, and shall then be subscribed by the deponent. Any witness summoned or whose deposition is taken under this section shall be paid the same fees and mileage as are paid witnesses in the courts of the United States. Any notary public or other officer authorized by law of the United States or of a State, Territory, or possession thereof, or of the District of Columbia, to take acknowledgment of deeds, and any consular officer of the United States, shall be competent to administer oaths for the purposes of this section.

(b) In case of failure to comply with any such subpœna or make any written answer, or in case of the contumacy of any witness before the Commission or any such officer or employee, the Secretary may invoke the aid of any court having the powers of an United States district court. The court may thereupon order the witness to comply with the requirements of such subpœna, to give evidence touching the matter in question, or to make answer

in writing under oath. Any failure to obey the order may be punished by the court as a contempt thereof.

(c) No person shall be excused from so attending, testifying, or deposing, or from so producing any book, paper, document, or other evidence, or from making any answer in writing on the ground that the testimony or evidence may tend to incriminate him or subject him to a penalty or forfeiture, but no natural person shall be prosecuted or subjected to any penalty or forfeiture for or on account of any transaction made or thing done as to which, in obedience to a subpœna and under oath, he may so testify, depose, produce evidence, or make answer in writing; except that no person shall be exempt from prosecution and punishment for perjury.

SEC. 262. For the efficient administration of the functions vested in the Secretary or the Commissioner by this title (except the functions vested by part I thereof and by subdivision (a) of section 224) the Commissioner or any officer or employee of the Bureau specifically designated by the Secretary in writing for the purpose, shall at all reasonable times, for the purpose of examination, have access to and the right to copy any book, paper, document, or other statement relating to any matter which the Commissioner is authorized to regulate or investigate under the provisions of this title.

ISSUANCE, SUSPENSION, AND REVOCATION OF CERTIFICATES

SEC. 263. (a) The Secretary shall, within 90 days after application for any certificate authorized to be issued in accordance with regulations made under section 222 or 224, issue such certificate or give the applicant 10 days' notice to show cause why such certificate should be issued. The Secretary shall not suspend (except as provided in subdivision (d) of this section) or revoke any certificate issued in accordance with such regulations, unless 10 days' notice has been given to the holder of the certificate. Notice required by this subdivision shall be served personally or by registered mail upon the applicant for the certificate or the holder thereof.

(b) Upon petition made by the applicant for the certificate or by the holder thereof within 10 days after the receipt of any such notice, in such manner and upon such forms as the Secretary may by regulation prescribe, the Secretary shall present to the petitioner a statement of the reasons for refusal to issue or for the suspension or revocation of the certificate, and afford him an opportunity for public hearing in person or by counsel and through witnesses.

(c) If, after such hearing, the Secretary finds that the petitioner is not entitled to the certificate, or that the certificate should be suspended or revoked in accordance with the regulations prescribed under section 224, the Secretary shall make a report in writing as to his findings of fact and shall enter in the records of the Bureau an order refusing to issue, or suspending or revoking the certificate, as the case may be, and give notice of the order to the petitioner. The evidence taken at the hearing shall be reduced to writing and filed in the records of the office of the Secretary. Such records shall be open for inspection by interested persons at all reasonable hours.

(d) The Secretary may, in proceeding for the suspension or revocation of the certificate, suspend any certificate pending entry of his order under this subdivision, or in case of an appeal from the order, pending action by the court under subdivision (g) of this section.

(e) An order made under subdivision (c) shall be final and conclusive unless, within thirty days after notification of the order, the petitioner appeals

to the circuit court of appeals for the circuit in which he resides (or if he does not reside within any such circuit, to the Court of Appeals of the District of Columbia), by filing with the clerk of the court a written petition praying that the Secretary's order be set aside or modified in the manner stated in the petition, together with a bond in such sum as the court may determine conditioned that the petitioner pay the cost of the proceedings on appeal if the court so directs. The clerk of the court shall immediately cause a copy of the petition to be delivered to the Secretary, who shall forthwith prepare, certify, and file in the court a full and accurate transcript of the record in such proceedings.

(f) The evidence so filed shall be considered by the court as the evidence in the case; except that if the court determine that the just and proper disposition of the case requires the taking of additional evidence, the court shall order the administrative hearing to be reopened for the taking of such evidence, in such manner and upon such terms and conditions as the court may deem proper. The Secretary may modify his finding as to the facts or make new findings by reason of the additional evidence so taken, and he shall file such modified or new findings, and his recommendations, if any, for the modification or setting aside of his order, with the return of such additional evidence.

(g) In case of an order of the Secretary extending or revoking any such certificate the court may, in its discretion, pending final decision upon the order, maintain the certificate in effect or suspend it.

(h) The circuit court of appeals may affirm, modify, or set aside the order of the Secretary, and its jurisdiction to review the order shall be exclusive and its decree final, except that the decree shall be subject to review by the Supreme Court of the United States upon certiorari as provided in section 240 of the Judicial Code, if such writ is duly applied for within 60 days after entry of the decree.

Civil Penalties

Sec. 264. (a) The master of any aircraft navigated without registration, identification or marking, or without a certificate of airworthiness, as required by this title or regulations made thereunder, shall be subject to a civil penalty of $1,000.

(b) The owner of any air navigation facility operated without an air facility certificate and any individual serving as an airman upon any aircraft without an air service certificate, as required by this title or regulations made thereunder, shall be subject to a civil penalty of $1,000.

(c) The master of any aircraft navigated in violation of clause (3) of subdivision (b) of section 225 in respect of rules of the air, signals, or any other matter specified therein, and the master of any aircraft navigated in violation of any executive order or regulation in respect of airspace reservations, shall be subject to a civil penalty of $500.

(d) Any person who fails to maintain or make any entry in any log book, and the owner of any land or water structure or the operator of any airdrome who fails to provide any signal, as required by this title or regulations made thereunder, shall be subject to a civil penalty of $500.

(e) The master of any civil aircraft who fails to make a report or to file any statement or to deliver any document as required by part 5 of this title or regulations made thereunder, shall be subject to a civil penalty of $1,000.

(f) The master of any civil aircraft who fails to make entry and the master of any aircraft which departs without clearance or which alights or takes off, in violation of part 5 of this title or regulations made thereunder, shall be subject to a civil penalty of $5,000, and the aircraft, aircraft stores, cargo, and baggage shall be subject to forfeiture.

(g) Each day during any part of which there continues any violation for which a penalty is imposed by subdivisions (a) to (d), inclusive, of this section, shall constitute a separate violation.

(h) No lien shall be enforced against any aircraft, and no forfeiture shall be enforced against any aircraft, aircraft stores, cargo, or baggage, for violation of this title if the person who owned the aircraft, aircraft stores, cargo, or baggage at the time of the violation can establish to the satisfaction of the court that he (and in addition the master of the aircraft, if the master was an employee of such person and acting in the course of his employment) was not a consenting party or privy to the violation.

(i) Any vessel navigated in violation of subdivision (f) of section 225 in respect of the rules for the prevention of collisions between vessels and aircraft, shall be subject to a civil penalty of $200, which shall be a lien upon the vessel, enforceable in the same manner as liens for penalties for violations of the navigation laws.

PROCEEDINGS FOR RECOVERY OF CIVIL PENALTIES

SEC. 265. (a) Any civil penalty imposed upon the master or owner of any aircraft under this title, shall constitute a lien upon the aircraft.

(b) Any aircraft subject to any such lien and any aircraft, aircraft stores, cargo, or baggage subject to forfeiture under this title, may be summarily seized by, and placed in the custody of, such persons as the Secretary may by regulations prescribe, or may be proceeded against by libel in rem. Any aircraft subject to any such lien or forfeiture may, if departing for any place outside the United States, be denied clearance.

(c) If the aircraft, aircraft stores, cargo, or baggage are summarily seized under this section, the custodian shall transmit a report of the case, with the names of available witnesses, to the United States attorney for the judicial district in which the seizure is made, for the enforcement of the lien or forfeiture by proceedings by libel in rem. The United States attorney shall, within a reasonable time, institute such proceedings or notify the Secretary of his failure so to act. The Secretary shall, upon any such notification, order the custodian to release the aircraft, aircraft stores, cargo, or baggage seized.

(d) If the aircraft is denied clearance, clearance shall not thereafter be granted it until the civil penalty constituting the lien is paid or until there is deposited in such manner as the Secretary may by regulation prescribe, a bond in an amount fixed, and with sureties approved, by the Secretary, and conditioned on the payment of the penalty (or so much thereof as is not remitted or mitigated) and of all costs and other expenses in proceedings, if any, necessary for the recovery of the penalty in case the petition for remission or mitigation is denied.

(e) In any suit to recover any civil penalty imposed upon an aircraft under this title, the proceedings may be against the master of the aircraft by libel in personam and/ or against the aircraft by libel in rem.

(f) Any person who is subject to any civil penalty imposed under this title or who has an interest in any aircraft, aircraft stores, cargo, or baggage

summarily seized, denied clearance, or seized under a process of arrest under this section, may petition the Secretary for remission or mitigation of the penalty or forfeiture. If, after a hearing, the Secretary finds circumstances justifying, in his opinion, the remission or mitigation of the penalty or forfeiture, he may by order entered in the records of his office, remit or mitigate the penalty or forfeiture (or any part thereof) upon such terms and conditions as he deems reasonable and just. In case libel proceedings are pending at any time during the consideration of the petition, the Secretary shall direct the United States attorney instituting the proceedings to notify the court of the pendency of the petition. In case the petition is made in respect of a civil penalty or forfeiture against an aircraft denied clearance, clearance shall be granted or continued to be withheld in accordance with the terms of the order. The order of the Secretary upon the petition shall be final.

Criminal Penalties

Sec. 266. Any person who—

(a) With intent to interfere with air navigation, exhibits within the United States any false light or signal at such place or in such manner that it is liable to be mistaken for a true light or signal prescribed by the Secretary under this title or regulations made thereunder, or for a light or signal connected with an aerial lighthouse, airdrome, or other aircraft facility;

(b) Knowingly removes, extinguishes, or interferes with the operation of any such true light or signal;

(c) Without lawful authority knowingly displays any such true light or signal;

(d) With intent to deceive, destroys, mutilates, or alters any log book of any aircraft or any entry therein;

(e) Fraudulently forges, counterfeits, alters, or falsely makes any certificate authorized to be issued by the Secretary under this Act or regulations made thereunder;

(f) Knowingly uses, attempts to use, or receives any such forged, counterfeited, altered, or falsely made certificate;

(g) Plunders, steals, or destroys aircraft stores, cargo, baggage, or other effects from any aircraft which is wrecked or in distress or which has made a forced landing while engaged in interstate or foreign commerce;

(h) Steals from the custody of any carrier by air any aircraft, aircraft stores, cargo, or baggage held by such carrier for transportation in interstate or foreign commerce, or steals any aircraft used for navigation in interstate or foreign commerce, or knowing it to have been so stolen, transports or receives any such aircraft, aircraft stores, cargo, or baggage, or navigates any such aircraft in interstate or foreign commerce—

shall upon conviction be punished by a fine of not more than $5,000 or imprisonment for not more than five years, or both.

Fees

Sec. 267. There shall be paid to the Commissioner prior to each registration, identification, and issuance of a certificate under this title a reasonable fee in an amount to be fixed by the Secretary. No registration or identification shall be made or certificate issued until the fee fixed therefor has been paid. All fees and penalties paid to the commissioner under the provisions of this Act shall be covered into the Treasury as miscellaneous receipts.

PART 7—CIVIL AERONAUTICS CONSULTING BOARD.

SEC. 701. There is hereby established a board to be known as the "Civil Aeronautics Consulting Board." The board shall be composed of seven members appointed by the Secretary from representatives of the aircraft manufacturers, designers and engineers, and operators of common carriers by air. Any vacancy in the board shall be filled in the same manner as the original appointment. The members of the board shall serve without compensation, except reimbursement for traveling, subsistence, and other necessary expenses incurred in attending meetings of the board.

SEC. 702. It shall be the duty of the board (a) to establish and maintain liaison between the bureau and the civil aeronautical industry of the United States, and (b) at the request of the Secretary, to advise the Secretary, and upon its own initiative, to make recommendations to the Secretary, with respect to the solution of problems arising in civil aeronautical development or in the administration of any function vested in the Secretary or the commissioner by this Act.

SEC. 703. The Secretary shall furnish to the board from the personnel and facilities of the Department of Commerce, provided by Part 2 of this title, such clerical assistance, quarters, stationery, furniture, office equipment, and other supplies as may be necessary efficiently to execute the functions vested in the board by this section.

SEC. 704. Expenditures of the board under section 701 shall be paid upon vouchers approved by the board and signed by the chairman thereof. There is hereby authorized to be appropriated a sum not in excess of $5,000 to be available for expenses of the board, under section 701, incurred prior to July 1, 1924.

TITLE III—AIR NAVIGATION LAW OF THE UNITED STATES

PART 1—INTERNATIONAL AIR NAVIGATION

SOVEREIGNTY IN THE AIRSPACE OF THE UNITED STATES

SEC. 301. The Congress of the United States hereby declares that the United States has, to the exclusion of all foreign countries, complete sovereignty in the airspace of the United States; but the provisions of this Act shall not be construed to deprive the States of sovereignty in the airspace above their lands and waters except in so far as granted to the United States as an incident to the powers delegated by the States to the United States in the Constitution.

AIRCRAFT OF THE UNITED STATES UPON THE HIGH SEAS

SEC. 302. The provisions of sections 223 to 226, inclusive (including all penalties for violation thereof and proceedings for the enforcement of such penalties), shall, whenever and to the extent provided by regulations of the Secretary, apply to aircraft and vessels of the United States and to aircraft and vessels owned by a domestic corporation (even though not a citizen of the United States within the meaning of Title I), while navigating the high seas or the airspace above the high seas, and to airmen employed upon or in connection with such aircraft, so long as, and to the extent that, such pro-

visions are not in conflict with the law of nations, treaties of the United States, or Acts of Congress passed for the enforcement of the provisions of such treaties.

AIRCRAFT OF THE UNITED STATES IN FOREIGN COUNTRIES

SEC. 303. The provisions of sections 223 to 226, inclusive (including all penalties for violation thereof and proceedings for the enforcement of such penalties), shall, whenever and to the extent provided by regulations of the Secretary, apply to aircraft of the United States and to aircraft owned by a domestic corporation (even though not a citizen of the United States within the meaning of Title I), while navigating the air space above foreign countries and to airmen employed upon or in connection with such aircraft, so long as, and to the extent that, (1) the foreign country has no law upon the matters covered by such provisions, and (2) such application is not prohibited by or in conflict with the laws of such foreign country, or in conflict with any treaty of the United States with such country, or any Act of Congress passed for the enforcement of any such treaty.

FOREIGN MILITARY AIRCRAFT IN THE UNITED STATES

SEC. 304. Military aircraft in the service of any foreign country, including aircraft in command of an individual in the military service of any foreign country detailed for the purpose, may not be navigated in the United States except under special authorization given by the Secretary of State or in accordance with treaties of the United States. The President may employ such part of the military or naval forces of the United States, including the Coast Guard, or the militia of the United States, as he may deem necessary, to exclude such aircraft from the United States except in accordance with any such authorization.

PART 2—MARITIME LAW AND PROCEEDINGS

THE NAVIGATION RULES

SEC. 321. The international, coast and connecting inland waters, Great Lakes, Mississippi Valley, and other rules for the prevention of collisions of vessels, provided by other law of the United States, shall not apply to the navigation of aircraft or to the navigation of vessels in respect of aircraft.

THE NAVIGATION AND SHIPPING LAWS

SEC. 322. The navigation laws and the definition of "vessel" as found in section 3 of the Revised Statutes (except as specifically provided in parts 1 to 5, inclusive, of Title IV) and as found in section 2 of the Shipping Act, 1916, as amended, shall not be construed to apply to seaplanes or other aircraft.

ADMIRALTY PRACTICE IN SUITS FOR PENALTIES

SEC. 323. (a) The proceedings in suits by libel (whether in rem or in personam) under section 265 of this Act, and in suits by libel in rem for the enforcement of a penalty, lien, or forfeiture, for violation of law, imposed against an aircraft, aircraft stores, cargo, or baggage by any other Act of Congress, shall conform as near as may be to civil suits in admiralty, except that either party may demand trial by jury of any issue of fact, if the value in controversy exceeds $20. In case of a jury trial the verdict of the jury shall have the same effect as a finding of the court upon the facts. The fact that, in case of a libel in rem, the seizure is made at a place not

upon the high seas or navigable waters of the United States shall not be held in any way to limit the requirement of the conformity of the proceedings to civil suits in rem in admiralty. The libel proceedings shall be at the suit and in the name of the United States.

(b) The Supreme Court of the United States, and under its direction any court of the United States having jurisdiction of proceedings by libel in rem against aircraft, is authorized to prescribe rules regulating such proceedings in any particular not provided by law.

PART 3—LAWS RELATING TO COMMERCE GENERALLY

SEC. 331. All laws of the United States which are applicable to commerce, transportation, or navigation generally shall, so far as practicable, be held applicable to commerce, transportation, and navigation by air, unless such laws are by other provisions of this Act or are by their terms specifically made inapplicable to commerce, transportation, or navigation by air or limited to commerce, transportation, or navigation when conducted by instrumentalities other than aircraft.

PART 4—LIABILITY OF COMMON CARRIERS IN AIR TRANSPORTATION

SEC. 341. When used in this part of this title—

(a) The term "interstate and foreign commerce" means commerce (1) from a point in any State, Territory, or possession, or the District of Columbia, or the Canal Zone, to any point outside thereof; (2) between two points in the same State, Territory, or possession, or the District of Columbia, or the Canal Zone, but through any place outside thereof; or (3) wholly within any Territory or possession, or the District of Columbia, or the Canal Zone.

(b) The term "transportation" includes all instrumentalities and facilities for shipment or carriage, irrespective of ownership or of any contract, express or implied, for the use thereof, and all services in connection with the receipt, carriage, delivery, transfer in transit, ventilation, storage and handling of the property transported.

(c) The term "air transportation" means transportation wholly by air, or partly by air and partly by land and/or water.

(d) The term "carrier" means common carrier by air, land, or water, and includes any express company which is a common carrier and uses such means of transportation.

(e) The term "holder," when used in respect of a bill of lading, means the person who has both actual possession of such bill of lading and a right of property therein.

(f) The term "bill of lading" means a bill of lading, whether a straight bill or an order bill, and includes, in case of baggage, a check or receipt.

SEC. 342. (a) Any carrier receiving in the United States property for air transportation in interstate or foreign commerce (hereinafter referred to as the initial carrier) shall issue a bill of lading therefor. The initial carrier shall be liable to the holder of the bill of lading for the full amount of any loss, damage, or injury to such property if the loss, damage, or injury is caused by such initial carrier or by any subsequent carrier to which the property is delivered or over whose lines the property passes in the course of the transportation of the property on a through bill of lading. The liability imposed upon the initial carrier shall not be held to relieve the carrier actually causing the loss, damage, or injury from liability therefor.

(b) If the loss, damage, or injury occurs while the property is in the custody of a carrier by water, the liability of such carrier shall be determined under the laws and regulations applicable to transportation by water, and the liability of the initial carrier shall be the same as that of the carrier by water.

SEC. 343. Except as provided in section 344, no carrier shall by contract, receipt, rule, or regulation as to liability, amount of recovery, or released value of the property, other than baggage, or by any limitation in any rate, charge, classification, or tariff filed as now or hereafter required by law, or by other limitation of any character, exempt or limit itself in whole or in part from the liability imposed by section 342. Any such exemption or limitation shall be void and the holder of the bill of lading may recover the full amount of the loss, damage, or injury, despite any such exemption or limitation. In case of failure to issue the bill of lading or in case the bill of lading is lost, stolen, or destroyed, the person entitled to the bill shall have such right of recovery. In case the bill of lading which is lost, stolen, or destroyed is an order bill, the person claiming such right of recovery in any court proceedings shall give a bond, in an amount and with sureties approved by the court, to protect the carrier and any person injured by such recovery from any liability or loss incurred by reason of the original order bill remaining outstanding. In lieu of such bond approved by the court, a voluntary indemnifying bond may be agreed upon and, when given, shall be binding on the parties thereto. Recovery against the carrier by the person entitled to an order bill of lading, where the original bill has been lost, stolen, or destroyed, shall not relieve the carrier from liability to a person to whom the original order bill has been or shall be negotiated for value, without notice of the proceedings.

SEC. 344. A carrier may limit the amount of its liability for loss, damage, or injury to property for which recovery may be had under section 342, if (a) the carrier establishes and maintains differentials in its rates based upon a value of the property declared in writing by the shipper, or agreed upon by the shipper and the carrier, as the release value of the property, (b) such differentials have been found to be just and reasonable by the Interstate Commerce Commission in case the carrier is a carrier by railroad or an express company using its lines, by the United States Shipping Board in case the carrier is a carrier by water whose rates are subject to the jurisdiction of the Board, or by the Secretary in the case of any other carrier, (c) such differentials are established and maintained by order of the Secretary in effect prior to the beginning of the transportation of the property, and (d) such limitation of liability is noted upon the bill of lading. Such declaration or agreement shall have no other effect than to limit liability and recovery to an amount not exceeding the value so declared or released. No such declaration or agreement shall be held in violation of section 10 of the Interstate Commerce Act, as amended.

SEC. 345. Nothing in this part of this title shall be held to deprive the holder of a bill of lading (or in case of failure to issue the bill of lading, the person entitled thereto) of any remedy or right of action which he has under the existing law.

SEC. 346. No carrier shall provide by contract, receipt, rule, regulation, or otherwise a shorter period for giving notice of claims to the carrier for loss, damage, or injury to property incurred in air transportation in interstate or foreign commerce, than 90 days from the date of the delivery or tender of

delivery of the property by the carrier; no shorter time for filing of the claim with the carrier, than 120 days from such date; and no shorter time for the institution of suit upon the claim or any part thereof disallowed, than two years from notice in writing by the carrier to the claimant that the carrier has disallowed the claim or any part thereof specified in the notice. In case of the failure of the carrier to deliver or tender delivery of the property, the period for giving notice and filing of claim shall be computed from the date upon which a reasonable time for delivery has elapsed.

SEC. 347. Any carrier liable under this part of this title for loss, damage, or injury to property caused by any other carrier, may recover from such other carrier the amount of such loss, damage, or injury which is required to be paid, as evidenced by any receipt or judgment or transcript thereof.

SEC. 348. Any carrier which willfully fails to issue a bill of lading as required by section 342 or which violates any provision of section 343 or 346, shall be subject to a fine of not more than $500.

SEC. 349. The Act entitled "An Act relating to bills of lading in interstate and foreign commerce," approved August 29, 1916, as hereafter amended, shall be held applicable to air transportation in interstate or foreign commerce.

SEC. 350. The provisions of this part of this title should not be held to repeal any provision of the Interstate Commerce Act, as amended, nor to confer upon the Secretary concurrent jurisdiction of any matter within the jurisdiction of the Interstate Commerce Commission.

PART 5—PUBLIC USE OF NAVIGABLE AIRSPACE

SEC. 351. The use of the navigable airspace of the United States is hereby declared to be necessary for commerce among the several States and with foreign countries, for the establishment of air postoffices and postal routes, and for the national security and defense; and such airspace is declared to be subject for such purposes to a public right of freedom of navigation by aircraft.

SEC. 352. Except as the Congress may hereafter provide, all airspace above the minimum altitudes specified in the rules as to safe altitudes of flight, prescribed by the Secretary under section 224, is declared to be navigable airspace.

PART 6—OFFENSES COMMITTED ON BOARD AN AIRCRAFT

SEC. 361. (a) When used in sections 273 to 284, inclusive, 287, 288, and 290 to 307, inclusive, of the Criminal Code, approved March 4, 1909, as amended, the term "vessel" includes aircraft, and the terms "seaman" and "mariner," in case of an aircraft, mean a member of the crew of the aircraft.

(b) The provisions of such sections shall (except when in conflict with other provisions of this Act) apply to the offenses specified therein if committed, within the United States or upon or above the high seas or the Great Lakes or connecting waters, on board or in respect of an aircraft of the United States or an aircraft owned by a domestic corporation (even though not a citizen of the United States within the meaning of Title I of this Act), while such aircraft is being navigated in interstate or foreign navigation, to the same extent as if committed upon the high seas.

PART 7—PLACE OF TRIAL OF AIR NAVIGATION OFFENSES

SEC. 371. Proceedings for offenses committed on board or in respect of an aircraft while being navigated in interstate or foreign navigation, shall be brought in the judicial district where the offender is found or into which he is first brought.

SEC. 372. Proceedings for the enforcement of penalties, liens, or forfeitures against an aircraft, aircraft stores, cargo, or baggage of an aircraft shall be brought in the judicial district where the property is seized (whether summarily or under a process of arrest) or is first brought after such seizure.

SEC. 373. The provisions of this part of this title shall not apply in cases where it is otherwise specifically provided by law.

TITLE IV—APPLICATION OF EXISTING LAW TO AIR NAVIGATION

PART 1—CUSTOMS ADMINISTRATION

SEC. 401. Subdivision (a) of section 401 of the Tariff Act of 1922 is amended to read as follows:

"(a) VESSEL.—The word 'vessel' includes every description of water craft or other contrivance used or capable of being used, as a means of transportation on water; but does not include an aircraft, except that when used in sections 439, 440, 443, 444, 450, 451, 452, 453, 454, 455, 456, 457, 458, 484, 498, 581, 583, 584, 594, 598, 602, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 618, 619, and in subdivision (e) of this section, the word 'vessel' includes an aircraft as hereinafter defined."

SEC. 402. Subdivision (b) of section 401 of the Tariff Act of 1922 is amended to read as follows:

"(b) VEHICLE.—The word 'vehicle' includes every description of carriage or other contrivance used, or capable of being used, as a means of transportation on land, but does not include an aircraft."

SEC. 403. Subdivision (e) of section 401 of the Tariff Act of 1922 is amended to read as follows:

"(e) MASTER.—The word 'master' means the individual having command of the vessel or aircraft."

SEC. 404. Section 401 of the Tariff Act of 1922 is amended by adding at the end thereof a new subdivision to read as follows:

"(k) The terms 'aircraft,' 'civil aircraft,' 'forced landing,' and 'aircraft stores' have the meaning assigned them by Title I of the Civil Aeronautics Act of 1923; and the term 'sea stores' in the case of an aircraft means aircraft stores."

SEC. 405. Paragraph (2) of subdivision (a) of section 498 of the Tariff Act of 1922 is amended to read as follows:

"(2) Merchandise damaged by fire or marine or air navigation casualty on the voyage of importation, and merchandise carried on an aircraft which has made a forced landing;".

SEC. 406. Section 605 of the Tariff Act of 1922 is amended to read as follows:

"SEC. 605. SAME—CUSTODY.—All vessels, vehicles, aircraft, merchandise, and baggage seized under the provisions of the customs laws, and all vessels,

vehicles, merchandise, and baggage seized under the provisions of the laws relating to the navigation, registration, enrolling or licensing, or entry or clearance of vessels shall, unless otherwise provided by law, be placed and remain in the custody of the collector for the customs district in which the seizure is made, to await disposition according to law."

SEC. 407. Title IV of the Tariff Act of 1922 is amended by adding to the end thereof the following:

"PART 7—AIRCRAFT

"SEC. 651. In such cases as the Secretary of the Treasury shall by regulation prescribe, the master of every civil aircraft which arrives in the United States from a place outside the United States carrying merchandise (other than aircraft stores) or baggage destined for a place in the United States, shall have on board his aircraft a manifest in a form to be prescribed by the Secretary of the Treasury and signed by such master under oath as to the truth of the statements therein contained. The manifest shall conform as nearly as may be practicable to the form of manifest prescribed in section 431 of this Act, and shall specify separately the aircraft stores on board the aircraft. The original and one copy of such manifest shall be delivered to such customs officer as the Secretary of the Treasury may by regulation prescribe.

"SEC. 652. (a) The master of every civil aircraft carrying merchandise or baggage required to be specified in the manifest under section 651 shall, prior to arriving in the United States, mail a copy of such manifest to the Comptroller of Customs for the district in which is located the first port of entry to which such aircraft is destined. If such copy is not so mailed, or if the copy so mailed is not a true copy of the manifest delivered under section 651, the master of such aircraft shall (except in case of a clerical error) be subject to a penalty of $5,000.

"(b) Under such regulations as the Secretary of the Treasury may prescribe, the collector for such port of entry, or if any such aircraft has made a landing at a place other than such port of entry, then the collector for the district in which such landing is made, may require the master to give a bond, with sureties and in a penal sum (of not more than $10,000) satisfactory to the collector, and conditioned that a copy was so mailed and that such copy is a true copy of such manifest.

"SEC. 653. (a) Except as provided in subdivision (e) of this section, it shall be unlawful to unlade merchandise or baggage from a civil aircraft arriving in the United States from a place outside the United States elsewhere than at a port of entry for aircraft, or before a permit to unlade has been issued by the customs officer in charge of such port of entry, under such regulations as the Secretary of the Treasury may prescribe.

"(b) Any person who unlades or assists in unlading any merchandise or baggage in violation of the provisions of this section shall be subject to a penalty of $1,000, and all the merchandise and baggage so unladen shall be subject to seizure and forfeiture; and any person who unlades or assists in unlading any merchandise or baggage in violation of the provisions of this section knowing that any part thereof consists of merchandise the importation of which is prohibited, shall be guilty of a felony and upon conviction thereof shall be punished by a fine of not more than $5,000, or by imprisonment for not more than five years, or by both.

"(c) The master of a civil aircraft from which any merchandise or bag-

gage is unladen in violation of the provisions of this section shall be subject to a penalty equal to twice the value thereof; and in addition if any part of such merchandise or baggage consists of merchandise the importation of which is prohibited, he shall be guilty of a felony and upon conviction thereof shall be punished by a fine of not more than $10,000, or by imprisonment for not more than ten years, or by both, and the aircraft and all the merchandise and baggage carried on such aircraft shall be subject to seizure and forfeiture.

"(d) If any merchandise or baggage is unladen in violation of this section and transshipped to, placed in, or received on any other civil aircraft or any vessel or vehicle, the master of such other aircraft or vessel, or the person in charge of such vehicle, shall be subject to a penalty equal to twice the value of such merchandise and baggage but not less than $1,000, and such merchandise and baggage shall be subject to seizure and forfeiture; and in addition if any part of such merchandise or baggage consists of merchandise the importation of which is prohibited he shall be guilty of a felony and upon conviction thereof shall be punished by a fine of not more than $10,000, or by imprisonment for not more than ten years, or by both, and such other aircraft, vessel, or vehicle and all the merchandise and baggage so transshipped, placed in, or received on such other aircraft, vessel, or vehicle shall be subject to seizure and forfeiture.

"(e) The Secretary of the Treasury shall by regulation provide for the unlading of merchandise and baggage from an aircraft which has made a forced landing. Any violation of such regulations shall for the purposes of subdivision (b), (c), or (d) be considered a violation of the provisions of this section.

"SEC. 654. (a) Merchandise and baggage unladen from a civil aircraft at a port of entry for aircraft shall be retained at the place of unlading until entry of such merchandise and baggage is made and a permit for its delivery granted. Merchandise and baggage so unladen for which entry is not made within 48 hours, exclusive of Sundays and holidays, from the time of the entry of the aircraft, unless a longer time is granted by the collector, as provided in section 484 of this Act, shall be sent to the public stores and held as unclaimed at the risk and expense of the consignee in the case of merchandise and of the owner in the case of baggage, until entry thereof is made.

"(b) The master of any civil aircraft from which merchandise or baggage is unladen shall be liable for the payment of the duties accruing on any part thereof that is removed from the place of unlading without a permit therefor.

"SEC. 655. (a) Any aircraft which arrives in the United States from a place outside the United States carrying merchandise or baggage shown by the manifest to be destined to a foreign port or place may, after the report, entry, and clearance, proceed to such foreign port or place with the merchandise and baggage destined therefor, without unlading the same and without the payment of duty thereon, under such regulations as the Secretary of the Treasury may prescribe.

"(b) Any aircraft which arrives in the United States from a place outside the United States carrying merchandise or baggage shown by the manifest to be destined to a place in the United States other than the port of entry at which the aircraft first arrived may proceed with such merchandise and baggage to the port of entry for aircraft nearest the place to which such merchandise or baggage is destined, under such regulations as the Secretary of the Treasury may prescribe.

"(c) The Secretary of the Treasury is authorized to require the master of any aircraft proceeding under the provisions of subdivision (a) or (b) of this section to give a bond in an amount equal to the estimated duties upon the merchandise and baggage and conditioned that if any such merchandise or baggage is landed in the United States from such aircraft (1) entry therefor will be made, (2) a permit for unlading will be procured from the customs officer, and (3) such landing certificates or other evidence as the Secretary may prescribe, will be produced.

"SEC. 656. A civil aircraft arriving in the United States from a place outside the United States may retain on board, without the payment of duty, all aircraft stores. Aircraft stores unladen and delivered from such civil aircraft shall be considered and treated as imported merchandise, except that aircraft stores belonging to regular lines navigating between the United States and a place outside the United States, which are delayed in the United States for any cause, may be transferred under a permit from the collector and under customs supervision, from the aircraft so delayed to another civil aircraft of the same line and owner and engaged in the foreign trade, without the payment of duty thereon.

"SEC. 657. The Secretary of the Treasury is authorized to detail to ports of entry for aircraft such officers and employees of the customs as he may deem necessary, or to confer or impose upon any officer or employee of the United States stationed at a port of entry for aircraft, (with the consent of the head of the Government establishment in which the officer or employee is serving) any of the powers, privileges, or duties conferred or imposed upon officers or employees of the customs."

PART 2—PUBLIC HEALTH

SEC. 421. The Act entitled "An Act granting additional quarantine powers and imposing additional duties upon the Marine-Hospital Service," approved February 15, 1893, as amended, is amended by adding at the end thereof a new section to read as follows:

"SEC. 13. That when used in this Act, the term 'vessel' includes aircraft as defined in Title I of the Civil Aeronautics Act of 1923."

PART 3—IMMIGRATION

SEC. 431. As used in the laws relating to the immigration, exclusion, or expulsion of aliens:

(a) The term "vessel" includes an aircraft.

(b) The term "master" means the individual having command of the vessel or aircraft.

(c) The term "aircraft" means any form of contrivance now known or hereafter invented, used or designed for navigation of, or flight in, the air, except a parachute or other contrivance designed for such navigation but used primarily as safety equipment.

(d) The term "alien seaman" includes an alien employed on an aircraft in any capacity.

(e) The term "owner" includes a charterer.

SEC. 432. Section 10 of the Immigration Act of February 5, 1917, is amended to read as follows:

"SEC. 10. (a) That it shall be the duty of every person, including owners, masters, officers, and agents of vessels of transportation lines, or international bridges or toll roads, other than railway lines which may enter into a contract as provided in section 23, bringing an alien to, or providing a means for

an alien to come to, the United States, to prevent the landing of such alien in the United States at any time or place other than as designated by the immigration officers. Any such person, owner, master, officer, or agent who fails to comply with the foregoing requirements shall be guilty of a misdemeanor and on conviction thereof shall be punished by a fine in each case of not less than $200 nor more than $1,000, or by imprisonment for a term not exceeding one year, or by both such fine and imprisonment; or, if in the opinion of the Secretary of Labor it is impracticable or inconvenient to prosecute the person, owner, master, officer, or agent of any such vessel, such person, owner, master, officer, or agent shall be liable to a penalty of $1,000, which shall be a lien upon the vessel whose owner, master, officer, or agent violates the provisions of this section, and such vessel shall be libeled therefor in the appropriate United States court.

"(b) Aliens arriving by aircraft shall enter the United States only at times designated by immigration officers and at airdromes designated by the Commissioner General of Immigration as ports of entry for aliens arriving by aircraft. The Commissioner General shall not so designate any airdrome unless it has been designated under authority of law as a port of entry for aircraft.

"(c) The Commissioner General of Immigration, with the approval of the Secretary of Labor, shall by regulation prescribe the time and place for the entry of aliens arriving by an aircraft which has made a forced landing at any place other than at an airdrome designated under subdivision (b). The term 'forced landing,' as used in this subdivision, means a landing shown, under regulations prescribed by the Secretary of Commerce, to the satisfaction of an officer of the Bureau of Civil Aeronautics designated by the Secretary of Commerce, to have been forced by accident, stress of weather, or other necessity."

SEC. 433. Section 11 of the Immigration Act of February 5, 1917, is amended by striking out the words "or in a United States immigration station at the expense of such vessel, as circumstances may require or justify, a sufficient time to enable the immigration officers and medical officers stationed at such ports" and inserting in lieu thereof the following: "in a United States immigration station, or in such other place as the immigration officers may designate, at the expense of such vessel, as circumstances may require or justify, a sufficient time to enable the immigration officers and medical officers."

SEC. 434. Section 12 of the Immigration Act of February 5, 1917, is amended by inserting after the words "by water" the words "or air," and by striking out the word "seaport" and inserting in lieu thereof the word "port."

SEC. 435. Section 13 of the Immigration Act of February 5, 1917, is amended by inserting after the words "by water" the words "or air."

SEC. 436. Section 17 of the Immigration Act of February 5, 1917, is amended by striking out the words "sea or land border."

SEC. 437. Section 18 of the Immigration Act of February 5, 1917, is amended by inserting after the first sentence thereof a new sentence to read as follows: "Where the aliens are brought to this country by aircraft, and it is not practicable or proper in the judgment of the Secretary of Labor to return them by aircraft, they may be returned to the country whence they respectively came by any other means of conveyance designated by the Secretary of Labor"; and by striking out the words "the hospital under the supervision of the immigration officials" and inserting in lieu thereof the words

"a hospital under the supervision of the immigration or United States Public Health Service officials."

SEC. 438. Section 19 of the Immigration Act of February 5, 1917, is amended by inserting after the words "immigration officials" the second time such words occur a comma and the words "or by aircraft at any time or place other than as provided in section 10 or in regulations made under authority of law."

SEC. 439. Section 6 of the Immigration Act approved May 19, 1921, as amended and extended, is amended by striking out the word "seaport" and inserting in lieu thereof the word "port."

PART 4—NARCOTIC DRUG IMPORTS AND EXPORTS

SEC. 441. Section 1 of the Narcotic Drugs Import and Export Act, as amended, is amended by striking out the word "and" at the end of subdivision (c), striking out the period at the end of subdivision (d) and inserting in lieu thereof a semicolon, and by adding at the end of the section the following:

"(e) The term 'vessel' includes an aircraft as defined by Title I of the Civil Aeronautics Act of 1923; and

"(f) The term 'master' means the individual having command of the vessel or aircraft."

SEC. 442. Section 5 of the Narcotic Drugs Import and Export Act, as amended, is amended to read as follows:

"SEC. 5. That no smoking opium or opium prepared for smoking shall be admitted into the United States or into any territory under its control or jurisdiction for transportation to another country, or be transferred or transshipped within the United States or such territory from one vessel to another vessel for immediate exportation or for any other purpose; and, except with the approval of the Board, no other narcotic drug shall be so admitted, transferred, or transshipped."

SEC. 443. Section 8 of the Narcotic Drugs Import and Export Act, as amended, is amended by striking out the words "a penal sum double the amount of the penalty" and inserting in lieu thereof the words "an amount fixed and."

SEC. 444. The proviso of paragraph 60 of Title I of the Tariff Act of 1922 is amended to read as follows: "*Provided*, That nothing in this paragraph shall be construed to amend, modify, or repeal the provisions of the Narcotic Drugs Import and Export Act, as amended."

SEC. 445. The second paragraph of section 584 of the Tariff Act of 1922 is repealed.

SEC. 446. Section 644 of the Tariff Act of 1922 is amended to read as follows:

"SEC. 644. GENERAL REPEAL.—All laws and parts of laws inconsistent with the provisions of this Act are hereby repealed; except that nothing in this Act shall be held to repeal any provision of the Narcotic Drugs Import and Export Act, as amended."

PART 5—OFFENSES AGAINST NEUTRALITY

SEC. 451. The provisions of sections 11, 12, 13, 14, 15, 16, 17, and 18 of the Criminal Code, approved March 4, 1909, as amended, and Titles II, III, V, VI, and VII of the Espionage Act, approved June 15, 1917, including any penalty or forfeiture thereunder, shall apply to aircraft to the same extent that they apply to vessels.

TITLE V—MISCELLANEOUS

Weather Reports

Sec. 501. Section 3 of the Act entitled "An Act to increase the efficiency and reduce the expenses of the Signal Corps of the Army, and to transfer the Weather Service to the Department of Agriculture," approved October 1, 1890, is amended by adding at the end thereof a new paragraph to read as follows:

"It shall be the duty of the Chief of the Weather Bureau under the direction of the Secretary of Agriculture, (a) to furnish such weather reports, forecasts, warnings, and advices as may be required to promote the safety and efficiency of air navigation in the United States and upon the high seas, particularly upon air routes designated and approved by the Secretary of Commerce under the provisions of section 231 of the Civil Aeronautics Act of 1923, or established under other authority of law, and (b) for such purposes to observe, measure, and investigate atmospheric phenomena, and establish meteorological offices and stations."

Advisory Committee for Aeronautics

Sec. 502. The membership of the Advisory Committee for Aeronautics is increased from 12 to 14 members, to be appointed by the President. One each of the additional members shall be a representative of the Bureau of Civil Aeronautics, the Office of the Assistant Postmaster General in charge of the Air Mail Service, and the Coast Guard.

Separability

Sec. 503. If any provision of this Act is declared unconstitutional or the application thereof to any person or circumstance is held invalid, the validity of the remainder of the Act and the application thereof to other persons and circumstances shall not be affected thereby.

Time of Taking Effect

Sec. 504. This Act shall take effect upon its enactment; except that no penalty or forfeiture shall be enforced for any violation of parts 2, 3, 4, or 5 of Title II, occurring prior to 60 days after the enactment of this Act and except that Title IV shall take effect the day following the enactment of this Act.

H. R. 9462

67TH CONGRESS, 2D SESSION

IN THE HOUSE OF REPRESENTATIVES

DECEMBER 10, 1921

MR. STEENERSON introduced the following bill; which was referred to the Committee on the Post Office and Post Roads and ordered to be printed.

A BILL

To encourage commercial aviation and authorizing the Postmaster General to contract for air mail service, and prescribing rates of postage thereon.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Postmaster General is authorized to contract with any individual, firm, or corporation for the transportation of mail by aircraft between such points as he may deem advisable. The postage on matter to be carried by aircraft shall be three times the usual rate of postage, to be prepaid by distinctive postage stamps affixed, to be issued in such denominations as the Postmaster General may prescribe, and the compensation of the contractor shall not exceed two-thirds of the postage on the mail matter so carried.

H. R. 10717

67TH CONGRESS, 2D SESSION

IN THE HOUSE OF REPRESENTATIVES

MARCH 3, 1922

MR. KELLY of Pennsylvania introduced the following bill; which was referred to the Committee on the Post Office and Post Roads and ordered to be printed.

A BILL

TO ENCOURAGE COMMERCIAL AVIATION and authorizing 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 the Postmaster General is authorized to contract with any individual, firm or corporation for the transportation of mail by aircraft between such points and in accordance with such regulations as he may prescribe, at a rate not exceeding 1 mill per pound for

each mile carried. The additional postage in matter to be carried by aircraft shall be 5 cents for each ounce or fraction thereof, to be prepaid by distinctive postage stamps affixed: Provided, That nothing herein shall be construed to prevent the Postmaster General from adding, if necessary, sufficient first-class mail matter to make up a minimum load in accordance with the contract.

H. R. 11193

67TH CONGRESS, 2D SESSION

IN THE HOUSE OF REPRESENTATIVES

APRIL 6, 1922

MR. STEENERSON introduced the following bill; which was referred to the Committee on the Post Office and Post Roads and ordered to be printed.

A BILL

To encourage commercial aviation and authorizing the Postmaster General to contract for air mail service, and prescribing rates of transportation and postage thereon.

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 prescribed.

SEC. 3. That the rates of postage on air mail shall not be less than 6 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 at a rate not exceeding 2 mills per pound per mile, and to further contract for the transportation by aircraft of first-class mail other than air mail at a rate not exceeding one-half a mill per pound per mile.

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.

SECOND TENTATIVE DRAFT OF PROPOSED UNIFORM STATE LAW FOR AERONAUTICS

(Prepared by Conference of Commissioners on Uniform State Laws)

Be it enacted by:

SECTION 1. (Definition of terms.) In this Act "aircraft" includes balloon, airplane, hydroplane and every other apparatus used for flight through the air. A hydroplane shall be regarded as a water-craft while it is being operated on the waters of this State.

"Aviator" includes aeronaut, pilot, balloonist and every other person having any part in the operation or direction of aircraft while in flight.

"Passenger" includes any person riding in an aircraft but having no part in the operation or direction of aircraft while in flight.

SEC. 2. (Sovereignty in space.) Sovereignty in the space above the lands and waters of this State is declared to rest in the State.

SEC. 3. (Ownership of space.) The ownership of the space above the lands and waters of this state is declared to be vested in the several owners of the surface beneath, subject to the right of flight described in Section 4.

SEC. 4. (Lawfulness of flight.) Flight in aircraft over the lands and waters of this state is lawful, unless at such a low altitude as to interfere with the existing use to which the land or water, or the space over the land or water, is put by the owner, or so conducted as to be imminently dangerous to persons or property lawfully on the land or water beneath. The landing of an aircraft on the lands or waters of another, without his consent, is unlawful unless the landing was caused by circumstances over which the aviator had no control. For damages caused by a forced landing, however, the owner or lessee of the aircraft shall be liable, as provided in Section 5.

SEC. 5. (Damage on land). The owner of every aircraft which is operated over the lands or waters of this State is absolutely liable for injuries to persons or property on the land or water beneath caused by the ascent, descent or flight of the aircraft, or the dropping or falling of any object therefrom, whether such owner was negligent or not, unless the injury is caused in whole or in part by the negligence of the person injured, or of the owner or bailee of the property injured. If the aircraft is leased at the time of the injury to person or property, both owner and lessee shall be liable, and they may be sued jointly, or either or both of them may be sued separately. An aviator who is not the owner or lessee shall be liable only for the consequence of his own negligence. The injured person, or owner or bailee of the injured property, shall have a lien on the aircraft causing the injury to the extent of the damage caused by the air craft or objects falling or dropping from it.

SEC. 6. (Collision of aircraft.) The liability of the owner of one aircraft to the owner of another aircraft, or to aviators or passengers on either aircraft, for damage caused by collision on land or in the air, shall be determined by the rules of law applicable to torts on land, and by such regulations and customs relating to aerial navigation as may be properly applicable.

SEC. 7. (Jurisdiction over crimes and torts.) ALL crimes, torts and other wrongs committed by or against an aviator or passenger while in flight over this State shall be governed by the laws of this State; and the question whether damage occasioned by or to an aircraft while in flight over this State constitutes a tort, crime or other wrong by or against the owner of such aircraft, shall be determined by the laws of this State.

SEC. 8. (Jurisdiction over contracts.) All contractual and other legal relations entered into by aviators or passengers while in flight over this State shall have the same effect as if entered into on the land beneath.

SEC. 9. (Regulation of aviation.) The power and the duty to regulate intrastate aviation within this State is vested in the ( ). He shall prepare and promulgate such regulations controlling intrastate aviation within this State as are necessary for the protection of the public and the development of aviation, including regulations.

(a) for the departure, flight, landing and marking of aircraft;
(b) for the control and management of airdromes and landing places;
(c) for the carriage of passengers and freight by aircraft;

(d) for the issuance, suspension and revocation by him of licenses for aviators and aircraft;

(e) for the establishment of aerial travel routes;

(f) for the prescription of areas over which all flight shall be prohibited.

All regulations promulgated by the ( ) for the control of aviation shall be printed at least (six times in each of three newspapers) published within the State, and a copy mailed to each registered owner and licensed operator in the State, before such regulations shall take effect.

SEC. 10. (Penalty for violation of regulations.) Any person who shall violate any regulation for the control of aviation, duly promulgated and published by the ( ) shall be liable to a fine of not more than ($), to be recovered by the ( ) for the use of the State.

SEC. 11. (Aviator's license.) No aviator, except an aviator employed by the United States Government, shall operate or direct, or take any part in the operation or direction of, an aircraft in intrastate flight within this State unless he shall have been licensed by this State, or by another State or by the United States. Licenses shall be issued by the ( ) upon satisfactory proof, evidenced by practical and theoretical tests, of the applicant's ability to perform the act of operation or direction for which he is to be licensed, and upon the payment of a license fee of ($). Such license shall be valid for one year, unless sooner suspended or revoked for cause, after a hearing, by the ( ). Any aviator who shall violate the provisions of this section shall be liable to a fine of ($) to be recovered by the ( ) for the use of the State.

SEC. 12. (Aircraft license.) No aircraft, except an aircraft owned or operated by the United States Government, shall be operated in intrastate flight within this State unless its use shall have been licensed by this State, or by another State or by the United States. The ( ) shall inspect every aircraft presented to him for licensing and shall, if satisfied of its safety, register in a record book the facts regarding the ownership, construction and intended use of such aircraft, and issue a license to the owner thereof for its operation in this State. For such inspection, registration and licensing the ( ) shall be entitled to a fee of ($). Such license shall be valid for a period of one year, unless sooner suspended or revoked for cause by the ( ). Any aircraft owner or lessee who shall violate the provisions of this section shall be liable to a fine of ($) to be recovered by the ( ) for the use of the State.

SEC. 13. (Dangerous flying a misdemeanor). Any aviator or passenger who, while in flight over a thickly inhabited area or over a public gathering within this State, shall engage in trick or acrobatic flying or in any acrobatic feat, or shall fly at such a low level as to endanger the persons on the surface beneath, or drop any object except loose water or loose sand ballast, shall be guilty of a misdemeanor and punishable by a fine of not more than ($) or imprisonment for not more than ( ), or both.

SEC. 14. (Hunting from aircraft a misdemeanor.) Any aviator or passenger, who, while in flight within this State, shall intentionally kill or attempt to kill any birds or animals shall be guilty of a misdemeanor and punishable by a fine of not more than ($) or by imprisonment for not more than ( ), or both.

SEC. 15. (Uniformity of interpretation.) This act shall be so interpreted and construed as to effectuate its general purpose to make uniform the law of those States which enact it.

SEC. 16. (Short title.) This act may be cited as the Uniform Law for Aeronautics.

SEC. 17. (Repeal.) All acts or parts of acts which are inconsistent with the provisions of this act are hereby repealed.

SEC. 18. (Time of taking effect.) This act shall take effect ( ).

AIRCRAFT INSURANCE

NATIONAL AIRCRAFT UNDERWRITERS' ASSOCIATION

13 Park Row, New York City

OFFICERS

Edmund Ely (Aetna Life) ..... President
E. Stockton Martin (Home) ..... Secretary-Treasurer
Ambrose Ryder (N. A. U. A.) ..... Manager

The National Aircraft Underwriters Association is composed of insurance companies who are either writing aircraft insurance, or are interested in it one way or another.

Prior to the Spring of 1919 no special aircraft policy form had been adopted. Coverage was extended by applying riders, to the existing forms of automobile or fire policies. The underwriters of the various companies soon felt the need of an interchange of ideas and information to assist them in properly classifying the hazards involved. For this purpose there was formed in March 1920, an Association of underwriters who adopted the name "National Aircraft Underwriters Association." The objects of the Association as outlined in the original constitution are: (1) To serve as a medium of exchange of information; (2) to supervise and recommend the adoption of suitable policy forms and endorsements; (3) to investigate class and general hazards and to procure and compile information and statistics concerning losses and their causes and to devise, advocate and promote all reasonable and proper means of eliminating or reducing the hazards against and to promote intelligent understanding.

Since formulation of the constitution, the activities of the Association have been broadened to include: (1) Preparation of model specifications for hangers and landing fields, which are available to municipalities and private corporations, (2) inspection of aircraft and factory production methods (through the Underwriters' Laboratories, Inc.), (3) compiling accident data, (4) analysis of accidents with view to measuring and placing the hazards, (5) cooperation with the Bureau of Standards in fixing standards for material, manufacture and operation, (6) cooperation with the Underwriters Laboratories in registration and classification of aircraft and pilots and the compilation of an Aircraft Register, (7) compilation of experience and formulation of rates and coverages.

RECORDS

OFFICIAL WORLD'S RECORDS FOR THE YEAR 1922

For previous records see Aircraft Yearbook for 1921 and 1922

All records to be official must be homologated by the Federation Aeronautique Internationale. The National Aeronautic Association is the official representative of the F. A. I. in the United States and homologates the American records. These are official F. A. I. records.

(M. monoplane; B, biplane; T, triplane.)

CLASS A—SPHERICAL BALLOONS

1ST CATEGORY (21,189 CU. FT. AND LESS)

	Name	*Date*	*Time or Distance*
DURATION	Georges Cormier	July 1, 1922	17 hrs., 32 min., 25 sec.
DISTANCE	Georges Cormier	July 1, 1922	499.69 miles
	2ND CATEGORY (21,224 CU. FT. TO 31,783 CU. FT.)		
DURATION	Jules Dubois	May 14-15, 1922	23 hrs., 28 min.
DISTANCE	Georges Cormier	July 1, 1922	499.69 miles
	3RD CATEGORY (31,818 CU. FT. TO 42,377 CU. FT.)		
DURATION	Jules Dubois	May 14-15, 1922	23 hrs., 28 min.
DISTANCE	Georges Cormier	July 1, 1922	499.69 miles
	RECORDS REGARDLESS OF CATEGORY		
DURATION	H. Kaulen	Dec. 13-17, 1913	87 hrs.
DISTANCE	Berliner	Feb. 8-9, 1914	1896.86 miles
ALTITUDE	Suring & Borson	June 30, 1901	35,434.8 feet

CLASS B—DIRIGIBLES

DURATION	Castracane & Castruccio, P-5	June 25, 1913	15 hours
DISTANCE	Castracane & Castruccio, P-5	July 30, 1913	493.31 miles
ALTITUDE	Cohen on Coute	June 18, 1912	10,105.5 feet
MAXIMUM	Castracane & Castruccio, P-5	July 30, 1913	40.22 m.p.h.

CLASS D—GLIDERS

DURATION

Name	*Airplane*	*Engine*	*Place*	*Date*	*Time Hrs.*	*Min.*	*Sec.*
Maneyrol	Peyret		Itford (England)	Oct. 21, 1922	3	21	7

CLASS C—AIRPLANES

Name	*Airplane*	*Engine*	*Place*	*Date*	*Time Hrs.*	*Min.*	*Sec.*
DURATION							
B Bossoutrot & Drouhin	Farman Goliath	2-300 h.p. Renault	Bourget	Oct. 14-15, 1922	34	19	7
DISTANCE							
B Bossoutrot & Drouhin	Farman Goliath	2-260 h.p. Salmson	Villesauvage to laMarmogne	June 3-4, 1920	*Distance* 1190.04 miles		
ALTITUDE							
B Macready	Lepere	400 h.p. Liberty	Dayton, O.	Sept. 28, 1921	*Height* 34,509.5 ft.		
SPEED OVER 100 KILOMETERS							
B Maughan	Curtiss	275 h.p. Curtiss	Detroit, Mich.	Oct. 14, 1922	*Time Hrs.*	*Min.* 18	*Sec.* 6
SPEED OVER 200 KILOMETERS							
B Maughan	Curtiss	275 h.p. Curtiss	Detroit, Mich.	Oct. 14, 1922	*Time Hrs.*	*Min.* 36	*Sec.* 12
SPEED OVER 500 KILOMETERS							
B Bossoutrot	Farman F. 90	300 h.p. Salmson	Bourget	Nov. 15, 1922	*Time Hrs.* 3	*Min.* 35	*Sec.* 36
SPEED OVER 1,000 KILOMETERS							
B Bossoutrot & Bernard	Farman Goliath	2-260 h.p. Salmson	Villesauvage to laMarmogne	June 3-4 1920	*Time Hrs.* 10	*Min.* 19	*Sec.* 46
SPEED OVER 1,500 KILOMETERS							
B Bossoutrot & Bernard	Farman Goliath	2-260 h.p. Salmson	Villesauvage to laMarmogne	June 3-4, 1920	*Time Hrs.* 16	*Min.* 42	*Sec.* 8
HIGH SPEED OVER 1 KILOMETER							
B Mitchell	Curtiss	275 h.p. Curtiss	Detroit	Oct. 18, 1922	*Speed* 222.97 m.p.h.		
USEFUL LOAD CARRIED—DURATION							
Hill	Handley Page	2-450 h.p. Napier "Lions"	Cricklewood	May 4, 1920	*Time Hrs.* 1	*Min.* 20	*Load Lbs.* 3,306.09

	USEFUL LOAD CARRIED—(WITH 250 KILOS., 551.01 LBS.)			ALTITUDE	*Height* *Load Lbs.*
Boucher	Breguet	280 h.p.	Bourget	July 6,	22,251.7 ft. 551.01
	Rateau	Renault		1921	
	USEFUL LOAD CARRIED—(WITH 1500 KILOS., 3,306.09 LBS.)			ALTITUDE	*Height* *Load Lbs.*
Hill	Handley	2-450 h.p.	Cricklewood	May 4,	14,000 ft. 3,306.09
	Page	Napier "Lions"		1920	

CLASS C (2)—SEAPLANES

		DURATION			*Time*
Biard	Supermarine	450 h.p. Napier Lion	Naples	Aug. 12, 1922	*Hrs. Min. Sec.* 1 34 51 3/5
		DISTANCE			*Distance*
Biard	Supermarine	450 h.p. Napier Lion	Naples	Aug. 12, 1922	230.39 miles
		SPEED (OVER 100 KILOMETERS)			*Time*
Biard	Supermarine	450 h.p. Napier Lion	Naples	Aug. 12, 1922	*Hrs. Min. Sec.* 28 41 2/5
		SPEED (OVER 200 KILOMETERS)			*Time*
Biard	Supermarine	450 h.p. Napier Lion	Naples	Aug. 12, 1922	*Hrs. Min. Sec.* 57 37 2/5

AMERICAN RECORDS

1922

The following performances were not witnessed by representatives of the National Aeronautic Association or Federation Aeronautique Internationale and consequently can be classified only as the American records, although many exceed recognized world records.

Name	*Airplane*	*Engine*	*Place*	*Date*	*Time* Hrs.	Min.	Sec.	
B *Kelly & Macready	Fokker T-2	400 h.p. Liberty	*Duration* San Diego	Oct. 5-6, 1922	35	18	30	
			DISTANCE					
B *Kelly & Macready	Fokker T-2	400 h.p. Liberty	San Diego-Indianapolis	Nov. 3-4, 1922	*Distance* 2,060 miles			
			SPEED					
B *Maughan	Curtiss (Army)	275 h.p. Curtiss	Detroit	Oct. 16, 1922	248.5 m.p.h			Speed
			PULITZER TROPHY (1921)					
B Acosta	Curtiss Navy	Curtiss C-12	Omaha	Nov. 3, 1921		52	9	176.7 mi.
Coombs	Curtiss Cactus Kitten	Curtiss C-12	Omaha	Nov. 3, 1921				170.26

* Not homologated by the F. A. I. but official flights of the U. S. Army Air Service.

Event No.

Curtiss Marine Tr

Total Distance, 160 Miles (Eight Laps of 20 Miles). Cash Prizes: First, $1,200.00; Second

Detroit, October 8,

Contestants Finishi

Position	Airplane	Pilot	Racing Number	First Lap Min. Sec. Speed(M.P.H.)	Second Lap Min. Sec. Speed(M.P.H.)	Third Lap Min. Sec. Speed(M.P.H.)	Fourth Lap Min. Sec. Speed(M.P.H.)	Fifth Lap Min. Sec. Speed(M.P.H.)	Min. Se
First	Navy TR-1, Navy Aircraft Factory	A. W. Gorton, Lieut. U.S.N.	15	10 07.89 118.44	10 08.66 118.3	10 07.94 118.4	10 17.51 116.55	10 42.10 112.1	10 58
Second	Vought, VE7-H	H. A. Elliot, Lieut. U.S.N.	10	10 56.19 109.7	10 47.13 111.2	10 46.04 111.4	10 47.35 111.1	10 57.42 109.7	11 22

The Contest Committee believes this report to be accurate, but as re
tained from the contestants, mechanics, etc., there may be some errors.
having additional information, not contained therein, to notify us in orde
report.

Contestants Failing to

Position	Airplane	Pilot	Racing Number	First Lap Min. Sec. Speed(M.P.H.)	Second Lap Min. Sec. Speed(M.P.H.)	Third Lap Min. Sec. Speed(M.P.H.)	Fourth Lap Min. Sec. Speed(M.P.H.)	Fifth Lap Min. Sec. Speed(M.P.H.)	Min. Se
	Curtiss, 18-T	L. H. Sanderson, 1st Lieut. U.S.M.C.	4	9 52.95 121.4	9 46.81 122.7	9 35.39 125	9 34.16 125.3	9 51.09 121.9	10 19
	Curtiss, 18-T	R. Irvine, Lieut. U.S.N.	5	14 08.73 84.8	10 31.68 114	10 34.49 113.5	10 24.78 115.2	10 38.82 112.8	
	Gallaudet, D-4	W. E. Patterson, Lieut. U.S.N.	3	11 00.35 109	11 40.40 102.9	11 41.24 102.6	11 44.15 102.3	11 43.96 102.4	
	Navy TS-2, Navy Aircraft Factory	S. W. Galloway, Lieut. U.S.N.	12	11 41.42 102.6	11 24.20 105.2	11 25.85 105	11 35.67 103.4	11 36.73 103.3	
	Navy TR-3, Navy Aircraft Factory	D. Rittenhouse, Lieut. U.S.N.	16	10 28.00 114.6	10 16.93 116.7	11 21.75 115.9			
	Navy TS-2, Navy Aircraft Factory	H. J. Brow, Lieut. U.S.N.	11	11 17.54 106.2	11 48.26 101.6	11 47.32 101.8			
	Vought UO-1	F. P. Mulcahy, Capt. U.S.M.C.	1						
	Curtiss HA-2	A. J. Williams, Ensign U.S.N.	14						

Event

Pulitzer

Total Distance, 200 Kilometers, 155.342 Miles (Five Laps of 40 Kilometers, 3

Detroit, Oct

Contestants F

Position	Airplane	Pilot	Entrant	Racing Number	First Lap Min. Sec. Speed(M.P.H.)	Second Lap Min. Sec. Speed(M.P.H.)	Third Lap Min. Sec. Speed(M.P.H.)	Fourth Lap Min. Sec. Speed(M.P.H.)	Fifth Lap Min. Sec. Speed(M.P.H.)	Total Elapsed Time (Hr. Min. Sec. Speed(M.P.H.)	Motor	H. P.	Instr
First	Curtiss High Speed Pursuit	R. L. Maughan, Lieut. U.S.A.	U.S.A.S.	42	9 03.72 204.8	9 01.06 204.8	9 00.08 206.8	9 05.31 204.9	9 04.45 205.2	45 16.62 205.8	Curtiss	375	Sperry
Second	Curtiss High Speed Pursuit	L. J. Maitland, Lieut. U.S.A.	U.S.A.S.	41	9 37.19 193.5	9 19.31 199.9	9 30.17 195.9	9 05.49 202.8	9 17.25 200.5	46 35.57 193.8	Curtiss	375	Sperry
Third	Curtiss CR-2	H. J. Brow, Lieut. U.S.N.	U.S. Navy	40	9 76.44 181.2	9 35.12 194.1	9 34.22 194.3	9 43.26 191.5	9 38.15 193	48 07.19 192.8	Curtiss	400	Dixie M
Fourth	Curtiss CR-1	A. J. Williams, Ensign U.S.N.	U.S. Navy	8	9 58.88 186.8	9 53.02 189.2	9 53.01 188.2	9 55.04 187.8	9 57.96 187.	49 31.71 188.7	Curtiss	400	Dixie M
Fifth	Verville Sperry Racer	E. H. Barksdale, Lieut. U.S.A.	U.S.A.S.	49	10 21.52 160.	10 19.76 160.5	10 18.65 160.8	10 17.66 162.5	10 16.12 161.5	51 25.70 161.2	Wright	350	Dixie M
Sixth	VCP-1 Verville Packard	C. C. Mosely, Lieut. U.S.A.	U.S.A.S.	42	10 35.03 176.3	10 21.19 175.5	10 20.11 160.2	10 21.13 179.8	10 23.78 179.6	52 01.24 158.9	Packard	600	Dixie M
Seventh	Verville Sperry Racer	F. B. Johnson, Lieut. U.S.A.	U.S.A.S.	58	10 25.92 178.1	10 23.97 179.6	10 23.12 179.3	10 18.12 180.9	10 17.68 179.2	52 21.01 158.	Wright	350	
Eighth	Loening High Speed Pursuit	F. C. Whitehead, Lieut. U.S.A.	U.S.A.S.	45	10 58.02 169.9	10 53.93 171	10 52.22 171.3	11 02.12 168.	10 58.53 169.6	54 10.12' 170	Packard	600	Dixie M
Ninth	Loening High Speed Pursuit	L. D. Schulze, Lieut. U.S.A.	U.S.A.S.	46	11 47.22 155.9	11 32.92 161.2	11 32.73 161.6	11 25.37 162.1	11 37.29 160.1	57 39.73 162.2	Packard	600	Dixie M
Tenth	Thomas Morse High Speed Pursuit	C. L. Fissell, Lieut. U.S.A.	U.S.A.S.	48	12 17.73 152.5	12 17.23 152.5	12 09.59 153.1	11 58.51 160	11 55.24 160.	59 58.17 155.5	Packard	600	Dixie M
Eleventh	Thomas Morse High Speed Pursuit	F. O. D. Hester, Capt. U.S.A.	U.S.A.S.	47	16 28.13 113.1	11 29.76 161.	11 17.61 163	11 30.25 159.9	11 41.10 159.3	1 02 26.68 154.2	Packard	600	Dixie M

The Contest Committee believes this report to be accurate,
tained from the contestants, mechanics, etc., there may be some
having additional information not contained therein, to notify
report.

Contestants Failin

Position	Airplane	Pilot	Entrant	Racing Number	First Lap Min. Sec. Speed(M.P.H.)	Second Lap Min. Sec. Speed(M.P.H.)	Third Lap Min. Sec. Speed(M.P.H.)	Fourth Lap Min. Sec. Speed(M.P.H.)	Fifth Lap Min. Sec. Speed(M.P.H.)	Total Elapsed Time (Hr. Min. Sec. Speed(M.P.H.)	Motor	H. P.	Instr
	Navy X-1	L. H. Sanderson, Lieut. U.S.M.C.	U.S. Navy	9	10 02.27 183.5	9 55.27 187.1	10 01.47 185				Wright	600	Sperry
	BB-1	S. W. Galloway, Lieut. U.S.N.	U.S. Navy	18	11 24.13 163.3	11 21.83 163.3					Wright	400	Dixie M
	Verville Sperry Racer	St. Clair Streett, Capt. U.S.A.	U.S.A.S.	50	11 36.4 160.4	11 38.8 160.	11 13.18 165.9	11 01.49 168.9			Wright	350	Dixie M
	ME-1	F. P. Mulcahy, Capt. U.S.M.C.	U.S. Navy	7	12 50.6 145.	13 51.02 134.1					Wright	400	Dixie M

Contestants Failing to Start

Position	Airplane	Pilot	Racing Number	Remarks
	BB-2	D. Rittenhouse, Lieut. U.S.N.	6	Withdrawn
	Thomas Morse, MB-3		61	Withdrawn
	Thomas Morse, MB-3		62	Withdrawn

ophy Race

, $600.00; Third, $200.00. For fastest flight of laps 2, 3 and 4, $300.00

1922

g Race

ixth Lap c. Speed(M.P.H.)	Seventh Lap Min. Sec. Speed(M.P.H.)	Eighth Lap Min. Sec. Speed(M.P.H.)	Total Elapsed Time Min. Sec. Speed(M.P.H.)	EQUIPMENT Motor	H. P	Ignition	Spark Plugs	Carburetor
109.2	11 17 90 106.2	11 32.67 103.9	85 13.17 112.6	Lawrence J-1	220	Splitdorf	A. C.	Stromberg
105.6	11 28.15 104.8	11 19.83 106	88 18.38 108.7	Wright E-3	220	Splitdorf	B. G.	Stromberg

ch of the information contained therein had to be ob-
We request anyone finding any errors in the report, or
r that we may, at a later date, issue a supplementary

Finish Race

Sixth Lap c. Speed(M.P.H.)	Seventh Lap Min. Sec. Speed(M.P.H.)	Eighth Lap Min. Sec. Speed(M.P.H.)	Total Elapsed Time Min. Sec. Speed(M.P.H.)	Motor	H. P	Ignition	Spark Plugs	Carburetor	Remarks
116.3	10 15.70 117			Curtiss	400	Splitdorf	A. C.	Ball & Ball	Ran out of gasoline near end of last lap.
				Curtiss	400	Berkshire	A. C	Ball & Ball	Wing pontoon adrift, impaired controllability of plane; forced landing.
				Liberty	420	Delco	B. G.	Zenith	Propeller broken by something thrown by spray in water control.
				Lawrence	220	Splitdorf	Mosler	Stromberg	Withdrew—Oil pressure fell
				Wright	220	Splitdorf	B. G.	Stromberg	Forced landing, broken propeller
				Aeromarine	240	Splitdorf	B. G.	Stromberg	Withdrew due to loss of radiator water.
				Aeromarine	250	Splitdorf	B. G.	Zenith	Damaged wing tip and wing tip pontoon at start.
				Liberty	420	Delco	B. G.	Zenith	Scratched.

No. 5
Trophy

068 Miles). Cash Prizes: First, $1,500.00; Second, $600.00; Third, $300.00

ober 14, 1922

nishing Race

er	Spark Plugs	Carburetor	Fuel	Oil	Propeller	EQUIPMENT Radiator Type	Thermometer	Tachometer	Air Speed Indicator	Tires	Size
	A-C	Zenith	50% Gas, 50% Benzol	Gulf	Curtiss	Curtiss (Special Wing)					
	A-C	Zenith	50% Gas, 50% Benzol	Gulf	Curtiss	Curtiss (Special Wing)					
gneto	A-C	Bell & Ball	50% Gas, 50% Benzol	Extra Heavy	Curtiss	Curtiss (Special Wing)	Bach-Meter	Veeder		Goodyear	28x3
gneto	A-C	Bell & Ball	50% Gas, 50% Benzol	Extra Heavy	Curtiss	Lamblin (France)	National Gauge & Equipment Co	Veeder		Goodyear	
gneto	B-G	Stromberg	Aviation Gas	Liberty	McCook Field	Lamblin (France)	U.S. Army Type "D"	Van Sicklen Type "C"	Sperry	Goodyear	28x4
gneto	B-G	Zenith	50% Gas, 50% Benzol	Mobile B	McCook Field	McCook Field	Boyce	Van Sicklen Type "C"	Sperry	Goodyear	28x4
	A-C		50% Gas, 50% Benzol	Mobile B	McCook Field	Lamblin (France)					
gneto	A-C	Zenith	50% Gas, 50% Benzol	Mobile B	McCook Field	Loening Aero. Eng. Corp.	Boyce	Van Sicklen Type "C"	Pioneer	Goodyear	30x3½
gneto	Mosler	Zenith	50% Gas, 50% Benzol	Mobile B	McCook Field	Loening Aero. Eng. Corp	Boyce	Van Sicklen Type "C"	Pioneer	Goodyear	30x3½
gneto		Zenith	50% Gas, 50% Benzol	Extra Heavy	Thomas Morse Aircraft Corp.	Thomas Morse Aircraft Corp.	Boyce	Van Sicklen Type "C"	Pioneer	Goodyear	32x3½
gneto		Zenith	50% Gas, 50% Benzol	Extra Heavy	Thomas Morse Aircraft Corp.	Thomas Morse Aircraft Corp	Boyce	Van Sicklen Type "C"	Pioneer	Goodyear	32x3½

but as much of the information contained therein had to be sub-
errors. We request anyone finding any errors in the report, or
us in order that we may, at a later date, issue a supplementary

g to Finish Race

n	Spark Plugs	Carburetor	Fuel	Oil	Propeller	Radiator Type	Thermometer	Tachometer	Air Speed Indicator	Tires	Size	Remarks
	A-C	Stromberg			Hartzell	Lamblin (France)				Goodyear	28x4	Motor trouble, oil pressure fell
	B-G	Stromberg	50% Gas, 50% Benzol	Wolfsbrad		Special Wing	National Gauge & Equipment Co	Jos. E. Jones Type B		Goodyear	28x4	Broken oil lead
gneto	A-C	Stromberg		Liberty	McCook Field	Lamblin (France)	U.S. Army Type "D"	Van Sicklen		Goodyear	28x4	Oil pressure fell, motor froze.
gneto	A-C	Stromberg	50% Gas, 50% Benzol		Hartzell	Thomas Morse	Boyce			Goodyear	30x3	Oil radiator trouble.
gneto	A-C	Stromberg										

EVENT No. 2

DETROIT NEWS AERIAL MAIL TROPHY

Total Distance, 257.74 Miles (Ten Laps of 25.774 Miles). Cash Prizes: First, $1,200.00; Second, $600.00; Third, $200.00

DETROIT, OCTOBER 12, 1922

CONTESTANTS FINISHING RACE

CONTESTANTS					Total Elapsed Time				Motors	H.P.
Position	*Airplane*	*Pilot*	*Entrant*	*Racing Number*	*Hrs.*	*Min.*	*Sec.*	*Speed (M.P.H.)*		
FIRST	Martin Transport	E. H. Nelson, Lieut. U.S.A.	U.S.A.S.	26	2	27	20.72	105.	2 Liberty (Ford)	400
SECOND	Martin Bomber	Philip Melville, Lieut. U.S.A.	U.S.A.S.	25	2	29	40.33	103.2	2 Liberty	400
THIRD	Martin Bomber	C. M. Cummings, Lieut. U.S.A.	U.S.A.S.	23	2	32	29.07	101.5	2 Liberty	400
FOURTH	Martin Bomber	W. R. Lawson, Capt. U.S.A.	U.S.A.S.	22	2	32	31.16	101.2	2 Liberty	400
FIFTH	Martin Bomber	B. E. Ballard, Lieut. U.S.A.	U.S.A.S.	24	2	39	59.54	96.7	2 Liberty (Ford)	400

EVENT No. 3

AVIATION COUNTRY CLUB OF DETROIT TROPHY

Total Distance, 257.74 Miles (Ten Laps of 25.774 Miles). Cash Prizes: First, $1,200.00; Second, $600.00; Third, $200.00

DETROIT, OCTOBER 13, 1922

CONTESTANTS FINISHING RACE

CONTESTANTS					Total Elapsed Time				Motor	H.P.
Position	*Airplane*	*Pilot*	*Entrant*	*Racing Number*	*Hrs.*	*Min.*	*Sec.*	*Speed (M.P.H.)*		
FIRST	Honeymoon Express	H. R. Harris, Lieut. U.S.A.	U.S.A.S.	32	1	54	40.35	134.9	Liberty	440
SECOND	Curtiss, Oriole		Curtiss Exhib. Co.	30						
SECOND (TIED)	U. S. Army, T-2	C. S. Jones			2	21	17.54	109.4	Curtiss, C-6	160
		R. S. Worthington, Lieut. U.S.A.	U.S.A.S.	27	2	50	22.55	90.7	Liberty	400

EVENT No. 4

LIBERTY ENGINE BUILDERS' TROPHY

Total Distance, 257.74 Miles (Ten Laps of 25.774 Miles). Cash Prizes: First, $1,200.00; Second, $600.00; Third, $200.00

DETROIT, OCTOBER 13, 1922

CONTESTANTS FINISHING RACE

CONTESTANTS					Total Elapsed Time					
Position	*Airplane*	*Pilot*	*Entrant*	*Racing Number*	*Hrs.*	*Min.*	*Sec.*	*Speed (M.P.H.)*	*Motor*	*H.P.*
FIRST	LaPere Observation	T. J. Koenig, 1st Lt. U.S.A.	U.S.A.S.	39	2	00	01.54	128.8	Liberty	400
SECOND	DeHaviland 4-B Observ.	Follet Bradley, Lt. U.S.A.	U.S.A.S.	36	2	02	14.21	126.5	Liberty	400
THIRD *	DeHaviland 4-B Observ.	Wm. L. Boyd, Lt. U.S.A.	U.S.A.S.	37	2	06	51.90	121.88	Liberty	400
FOURTH	DeHaviland 4-B Observ.	W. A. Carter, Lt. U.S.A.	U.S.A.S.	35	2	10	50.62	118.1	Liberty	400
FIFTH	DeHaviland 4-B Observ.	J. D. Givens, Lt. U.S.A.	U.S.A.S.	34	2	15	23.75	114.1	Liberty	400
SIXTH	DeHaviland 4-B Observ.	B. R. Morton, Lt. U.S.A.	U.S.A.S.	33	2	17	08.98	112.7	Liberty	400

* Note—Airplane No. 37 disqualified due to streamline covering over rear cockpit and failure to carry required load.

EVENT No. 5-A

JOHN L. MITCHELL TROPHY

Total Distance, 200 Kilometers, 124.274 Miles (Four Laps of 50 Kilometers, 31.068 Miles). Cash Prize, $250.00

DETROIT, OCTOBER 14, 1922

CONTESTANTS FINISHING RACE

CONTESTANTS				Total Elapsed Time					
Position	*Airplane*	*Pilot*	*Racing Number*	*Hrs.*	*Min.*	*Sec.*	*Speed (M.P.H.)*	*Motor*	*H.P.*
FIRST	Thomas Morse, MB-3	D. F. Stace, Lieut. U.S.A.	54		50	25.73	147.8	Wright	300
SECOND	Thomas Morse, MB-3	A. M. Guidera, Capt. U.S.A.	51		54	48.32	136	Wright	300
THIRD	Thomas Morse, MB-3	O. W. Broberg, Capt. U.S.A.	55		55	07.87	135.1	Wright	300
FOURTH	Thomas Morse, MB-3	B. K. McBride, Lieut. U.S.A.	52		55	23.11	134.4	Wright	300
FIFTH	Thomas Morse, MB-3	H. N. Elmendorf, Capt. U.S.A.	53		59	48.77	128.2	Wright	300

EVENT No. 6

ON TO DETROIT RACE

Cash Prizes: First, $500.00; Second, $250.00; Third, $100.00

DETROIT, WEEK OF OCTOBER 8, 1922

Pilot	*Plane*	*Start*	*Elapsed Time*	*Distance*	*Motor*	*Horse-power*	*Points*	*Total Points*	*Entrant Address*
W. H. Beech	Laird Swallow	Oct. 9, 7:30 A.M.	H.M. 57.18	Wichita, Kan., 810 miles	Curtiss OX-5	90	170	220	Laird Airplane Co., Wichita, Kansas
C. S. Jones	Curtiss Oriole	Oct. 9, 2:43 P.M.	H. M. 1.57	Buffalo, N. Y., 200 miles	Curtiss C-6	160	135	207	Curtiss Exhibition Co., Garden City, N. Y.
Ed. Stinson	J-L Monoplane	Oct. 12, 11:15 A.M.	H. M. 2.32	Chicago, Ill., 242 miles	German B.M.W.	233	95	181	Ed. Stinson, 7623½ Eastlake Ave., Chicago, Ill.
S. S. Moore	Canadian Curtiss	Oct. 13, 8:45 A.M.	H. M. 3.10	Toronto, Can., 188 miles	Curtiss OX-5	90	170	179	F. G. Ericson, 120 King St. E., Toronto
Shirley Short	Breguet	Oct. 11, 9:50 A.M.	H. M. 5.43	Monmouth, Ill., 401 miles	German Benz	250	90	161	S. Short, care of Monmouth Aero Club, Monmouth, Ill.
B. H. Pearson	Curtiss Oriole	Oct. 8, 11:33 A.M.	H. M. 98.55	Garden City, N. Y., 484 miles	Curtiss C-6	160	135	155	Curtiss Exhibition Co., Garden City, N. Y.
J. M. Johnson	Vought VE-7	Oct. 10, 1:10 P.M.	H. M. 31.06	Dayton, Ohio, 206 miles	Wright 1	154	135	155	Johnson Aeroplane Co., Dayton Ohio

AIR INSTITUTE SECTION

In seeking productive means for the fulfillment of the purposes for which it was formed, the Aeronautical Chamber of Commerce early realized the urgent necessity for bringing about a better understanding between commercial aviation and those elements in commerce and industry—such as banking, rail, highway and marine transportation, law, insurance, carriage of mail and express—with which the art has to do.

The idea of the National Air Institute, therefore, was conceived and a committee consisting of John R. Cautley, Wright Aeronautical Corporation; Paul G. Zimmermann, Aeromarine Plane and Motor Company; and Archibald Black, Consulting Engineer, was appointed to arrange the program. As has been narrated in Part I of this Chapter, the Chamber was in close liaison with the Detroit Aviation Society, and upon invitation of the latter, it was decided to hold the First National Air Institute at Detroit.

The Committee immediately got in touch with the National Advisory Committee for Aeronautics, the Society of Automotive Engineers, and the American Society of Mechanical Engineers, and arranged for co-operation with officials of these organizations in determining the scope of the Institute. As a result, the following program was arranged representative not only of the bodies named, but also of the American Bankers Association, American Bar Association and National Aircraft Underwriters' Association.

TEMPORARY CHAIRMAN—Sidney D. Waldon, President, Detroit Aviation Society.

PERMANENT CHAIRMAN—Prof. Herbert C. Sadler, Head, Department of Naval Architecture, Marine Engineering and Aeronautics, University of Michigan.

THE AIR MAIL—Col. Paul Henderson, Second Assistant Postmaster General.

THE IMPORTANCE OF SCIENTIFIC INVESTIGATION IN A GENERAL AERONAUTICAL PROGRAM—Dr. Joseph S. Ames, of Baltimore, Md., Head of Department of Science, Johns Hopkins University, and Chairman Executive Committee, National Advisory Committee for Aeronautics.

COMMERCIAL AVIATION AND THE COMMERCIAL BANK—THEIR RELATION TO EACH OTHER AND TO TRADE—Lewis E. Pierson, of New York, Chairman of the Board, Irving-Columbia Trust Co., and President, Merchants Association of New York.

FLYING BOAT TRANSPORTATION—Charles F. Redden, of New York, President, Aeromarine Airways, Inc.

ANALYSIS OF THE PROPOSED CONTRACT AIR MAIL ROUTE BETWEEN CHICAGO AND NEW YORK—C. G. Peterson, of Paterson, N. J., Manager Plane Division, Wright Aeronautical Corp.

AERONAUTICAL LEGAL PROBLEMS—William P. MacCracken, Jr., of Chicago, Chairman, Aviation Committee, American Bar Association.

COMMERCIAL AIR TRANSPORT THE NEXT STEP—J. Rowland Bibbins, of Washington, D. C., Manager, Department of Transportation and Communications, United States Chamber of Commerce.

THE STATUS OF AIRCRAFT INSURANCE—Edmund Ely, of New York, Aetna Life Insurance Company, and President, National Aircraft Underwriters' Association.

FUNDAMENTALS OF COMMERCIAL FLYING—REVIEW OF DEVELOPMENTS IN EUROPE—Prof. E. P. Warner, Head, Aeronautics Department, Massachusetts Institute of Technology, Cambridge, Mass.

PLANS FOR 1923 AIR INSTITUTE

After the reading of the papers there was general discussion, and, upon motion by Glenn L. Martin, of Cleveland, seconded by Dr. George W. Lewis, Executive Officer, National Advisory Committee for Aeronautics, it was decided to make the National Air Institute an annually recurring event.

At the time of publication, the following committee on arrangements had been designated:

FRANK H. RUSSELL, Vice President Curtiss Aeroplane and Motor Corporation, representing the Aeronautical Chamber of Commerce, of which he is a governor, Chairman.

L. CLAYTON HILL, Assistant and General Manager, Society of Automotive Engineers, representing the Society.

E. P. WARNER, Professor of Aeronautics, Massachusetts Institute of Technology, representing American Society of Mechanical Engineers.

DR. GEORGE W. LEWIS, representing National Advisory Committee for Aeronautics.

HUGH W. ROBERTSON, representing National Aeronautical Association.

COMMERCIAL AVIATION AND THE COMMERCIAL BANK—THEIR RELATION TO EACH OTHER AND TO TRADE

Commercial Banks Need Aviation More Than Aviation Needs Them—Air Transport Will Make Very Great Contribution to Commerce—Character, Capacity, Capital Necessary to Success.

By Lewis E. Pierson, Chairman of the Board, Irving Bank-Columbia Trust Co., New York, and President, Merchants Association, New York City

Air transportation is one of the incompletely developed facilities of modern commerce while the commercial bank is merely one facility that may perhaps be considered to have completed long since its development stage.

Perhaps the average man in business today, through a process of association, falls unconsciously into the error of considering commercial banks as sources of wealth rather than as merely instrumentalities which have come into existence because of the need of certain financial facilities involved in the concentration, safeguarding, and transfer of other people's money.

If one clearly apprehends the function of a modern bank one cannot fail to see that it comes into being only as a result of industry and commerce and is not the forerunner of those two manifestations of modern economic life. Hence, we arrive at the rather surprising conclusion that commercial banks need aviation more than aviation needs them. This does not imply the present readiness of commercial banks to finance the development of air transportation—it simply means that banks will benefit in direct ratio to the contribution which aviation will make to commerce. That this contribution will be very great no one seriously doubts, and, therefore, the up-to-date banker must give serious thought to the part which he must play now and in the future in assisting to bring about the realization of the plans of those who are today laying the foundations of America's aerial commerce.

To Hasten Co-ordination and Co-operation

I believe that bankers can be helpful and I am also sure that the most certain method of assuring a close co-operation is by clearing away all misunderstandings that may exist—the misunderstanding of the banker regarding the capabilities of air transportation as well as the misunderstanding of those in aviation regarding the true rôle of the commercial bank.

I shall leave to other speakers well versed in the new science the duty of clearing up the very foggy ideas of bankers regarding the technique of air transportation as a fact in modern commerce. My obligation in this matter as I see it is to set before you the ensemble of aviation in its present stage of development as a commercial banker sees it, to point out its weak spots, and then to consider with you ways and means of hastening the day when the bank facility and the air transport facility of modern commerce will function co-ordinately as instrumentalities of commerce with mutual benefit to each other.

You desire and expect a certain amount of conservation in your banker—

you do not expect to find him losing his sense of proportion when the enthusiastic conceptions of the budding aviation engineer are laid before him. However much you may desire to see the ardent young spirit of aviation carry itself in real and imaginary flights of incredible swiftness to the uttermost parts of the world, you certainly desire to have your banker keep both feet on the ground. His conservatism may be a means of defense for you against your own enthusiasm.

But let us define conservatism before we proceed. A definition which appeals to me as a guide is the following:

Conservatism is caution without timidity; a respect for experience without a feeling that nothing good remains to be discovered; a demand that proof be submitted, accompanied by a hope that proof *can* be submitted.

It is not incompatible with this brand of conservatism that the banker in looking at the aviation ensemble today should revert to the time-honored credit factors as the basis of his criterion—character, capacity, capital.

Character First Essential

A corporation, an industry, has not a soul but it certainly has a character. What are the intangibles that give character to aviation today? Are they not a blend of courage and daring, tenacity and hope, ambition and vision? All these are the characteristics of the pioneer. But just as the pioneer settler in a desert country could never achieve the success of his brother who, though possessing no greater qualities, settled in fertile and well watered lands, so the aviation industry, however superb its character, cannot achieve success without a right start.

I feel that it is proper that the right start should be given by a certain measure of Federal Government control. This will first of all take the form of licensing of pilots and aircraft; then Federal, State and Municipal governmental co-operation in establishment of airways; and later we may work out an acceptable scheme of Government subsidies for operating companies. Given this foundation the next essential is public confidence—that means not only a willingness to use aircraft for passenger and freight transport but willingness to contribute capital. You will come then to your banker with a business character that has the stamp of Government and public approval.

Now as to the capacity in general of the management of the aviation industry. We have no standard of success in the operation of air lines on which to base an estimate of your capacity, for the very simple reason that so far as is known no air transportation companies can yet show an operating profit. The great thing to be accomplished, then, is the demonstration of a capacity to earn dividends. Familiar as I am with the splendid personnel of the industry I lack no confidence in the ultimate "submission of proof" on this point. The progress along these lines cannot be unattended with most of the ills characterizing a period of deflation. Aviation is suffering from a heavy load of overhead and excessive operating costs inherited from the war. The pruning knife of economy must be wielded ruthlessly if management is to have half a chance to demonstrate its inherent efficiency.

How the Banker Can Help

How can bankers and the general public help you to build on your three C's of credit? Bearing in mind your dual rôle as a factor in national defense and national commerce, they should use their influence to obtain for you a proper measure of Governmental assistance; realizing the vital need for main-

taining a high morale in aviation they should decry the continuation of flying circuses and country fair exhibitions which lower the public esteem for the industry as a whole; studying your progress with conservative but open minds bankers should prepare themselves to advise their clients who may consider contributing capital for your proper enterprises, and finally, when you have established yourself as a "going concern," when you have become like a commercial bank an instrumentality of commerce, undoubtedly bankers will be prepared to finance your current needs and to use your facilities for the better accomplishment of their own functions in the economic life of the nation.

ANALYSIS OF THE PROPOSED CONTRACT AIR MAIL ROUTE BETWEEN CHICAGO AND NEW YORK

Equipment Necessary for Overland Air Line—Time Saved by Air as Against Mail Trains—Bringing the Mississippi Valley and Atlantic Seaboard Closer by One Business Day.

By C. G. Peterson, Manager Plane Division, Wright Aeronautical Corp., Paterson, N. J.

Let us divide aviation into two classes, military and commercial. These distinctions overlap in many types of planes, but the broad classification of commercial aviation is aviation that is not for military or naval purposes. We can then subdivide commercial aviation into three general headings: Planes owned and operated by private individuals for sporting purposes and for travel; planes owned by companies for sight-seeing and industrial work, including mapping, photography, or forestry patrol, and planes owned and operated by companies for transportation purposes including the transportation of passengers, express matter or mail.

I will endeavor to point out why it is our belief that the large volume of commercial aviation will fall into the last class of transportation, that is mail, and show why mail-carrying will be the first step in establishing successful and dependable transportation lines.

The field for individual ownership will be more or less restricted for several reasons. The expense of operating a plane in addition to its first cost, the difficulty for an individual of obtaining adequate landing facilities, and the comparatively short life and low resale value of present day planes. It is appreciated when one leaves the crowded eastern seaboard that landing fields become more numerous, particularly between the Mississippi and the Rockies. It is also appreciated that already some prominent yachtsmen have bought new planes and have operated them during the past summer for their own convenience and pleasure. Nevertheless, it is hard to visualize an extensive use of planes by individual owners.

The next classification of commercial aviation is the operation of planes by companies for various industries. This field is broadening out constantly. Map making from airplanes has proved exceedingly successful. A number of large contracts for map making have been placed by municipalities, railroads, and real estate corporations. I know of one company in Canada which has been able to afford several modern high price post-war planes with post-war engines for mapping purposes. This classification should also include companies which carry passengers for sight-seeing and the class of flying known as "beach hopping" or "joyriding." This whole classification will increase gradually in some phases and decline in other phases as the supply of war built planes which can be purchased at a low price decreases. But commercial aviation falling in this category is not what Americans are looking forward to as the large field for commercial aviation.

The Big Field in Air Transport

Transportation of passengers, express, and mail is where most Americans look for the broad field for commercial aeronautics. Carrying passengers,

perhaps, comes first to the minds of all who think of transportation by air. There are several serious difficulties to be overcome before the transportation of passengers can be made successful. These difficulties in passenger carrying may be briefly summarized in the high rates which must be paid by the passengers, the difficulty of obtaining proper landing fields near the center of population of the larger cities, the educational work needed in inducing the public at large to make use of the inter-city lines even if such are established, the high risk of liability on passengers, and the difficulty in finding routes which can be operated properly throughout the entire year. Splendid examples of pioneer work on passenger transportation have been shown in the Cleveland-Detroit line, the Key West Havana line, and lines operated from Florida to Bermuda. But it will be noted that most of these lines have been operated over selected water routes and for one season of the year only. It has been found abroad practically impossible to operate passenger lines without a government subsidy. American aviators do not desire a subsidy, nor as I will point out, is a subsidy necessary for successful commercial aviation in the United States. The express business, undoubtedly, will eventually make use of transportation by air just as soon as such aerial transportation lines are in successful operation. But it cannot be expected that the express companies can finance such lines or give definite guarantees of the quantity of express matter that will be shipped, and without such guarantees a line cannot be initiated.

The Benefits to Be Derived

Now, let us look at the benefits to be derived by carrying mail by air, the cost, and how this cost will be spread thinly over millions of business men and women of the country. Very few of us realize the quantity of mail that passes daily between the large cities. There are approximately 25 tons of first class mail sent daily from New York to Chicago. This includes the gateway mail at each end and considerable other mail matter, in addition to letters. There are on an average of 160,000 letters a day collected in New York City for delivery in Chicago City. This quantity does not include gateway mail at either end. The quantity of gateway mail is several times this amount. There are approximately 325,000 letters a day sent from Chicago to New York for delivery in New York City. The figures given are for letters and first-class mail and do not include other classes of mail of which there is a tremendous volume.

The entire business community is awake to the necessity of time saving. When some new method of handling correspondence comes out that will accelerate the mail one or two hours, it will be grasped immediately by the business world. Think what the response will be when it is possible to save an entire business day on business correspondence; when manufacturers and merchants will obtain orders from their salesmen a day earlier; when bankers will be able to save a day's interest in the transportation of their securities; when documents, specifications or samples can be received a thousand miles away the day after they were mailed. Every class of modern industry will feel the advantage of this saving of a business day.

It must be remembered when one figures on carrying mail by air that the length of the route must be sufficient to offset the loss of time in transit from the Post Office to the flying field at both ends of the route. Also that the heavy mail is collected at the close of the business day and that there is little advantage in considering carrying mail by air between the cities situated so

closely together that mail leaving by train at, say after 8 o'clock in the evening, will arrive at its destination for early distribution the next morning. We must therefore look to long distance routes in order to take full advantage of the time saved.

New York-Chicago Route

Last spring I made up a chart for the use of the Congressional Committee on the Post Office and Post Roads. This chart shows the time the four principal mail trains leave New York for Chicago and the time a paralleling flight by a plane could be made, and the saving in time thereof.

A summary of this chart is as follows (In plotting this chart allowance has been made for the change of standard time and the average velocity of the wind which is from the west):

Westbound

Train No. 43, the newspaper train, with three 60 foot R. P. O. cars and 5 storage cars, leaves New York at 2:10 A. M., arrives in Chicago 24 hours afterward, and its mail is delivered in Chicago at 9 A. M. of the second day, over 31 hours after it leaves New York.

Flight No. 1 will leave New York at 2 A. M., arriving in Chicago at noon for delivery downtown by 2 P. M., *saving one business day on* 42,000 *letters.*

Train No. 19, with one 60 foot R. P. O. car and one storage car, leaves New York at 5:31 P. M., arriving in Chicago the next afternoon at 4 P. M., too late for delivery that afternoon, and the mail is delivered in Chicago 9 o'clock the following morning, 40½ hours after it leaves New York.

Flight No. 3 will take the mail from train No. 19 at Erie, flying it to Chicago, to arrive at noon for distribution by 2 o'clock that afternoon, *saving one business day on* 42,000 *letters.*

Train No. 35 is a very heavy letter train, leaving New York at 8.40 P. M., with one 60 foot R. P. O. car and 5½ storage cars, arriving in Chicago at 8 o'clock the next evening. Its mail lays over until the next morning and is delivered 35 hours after leaving New York.

Flight No. 5 will leave New York at 8 P. M., arriving in Chicago at 6 A. M., for the first delivery in the morning, *advancing* 42,000 *letters one business day.*

Flight No. 7 is an additional plane leaving New York at the same time but carrying mail for West of Chicago. Flight No. 7 arrives in Chicago at 6 A. M. By using additional planes out of Chicago connecting with Flight No. 7, the mail can be flown to arrive in St. Louis at 10 A. M., to be delivered by noon—to arrive in St. Paul at 11 A. M., to be delivered by 2 P. M.,—and to arrive as far West as Kansas City by noon, to be delivered by 2 P. M., *saving one business day on* 42,000 *letters.*

Train No. 93 leaves New York at 9:26 A. M., carrying one 60 foot R. P. O. car as far as Cleveland, where it arrives at 4:35 the next morning for delivery approximately 24 hours after it leaves New York.

Flight No. 9 leaves New York at 6 A. M., arriving in Cleveland at noon for delivery by 2 P. M., *saving one business day on* 42,000 *letters.*

Eastbound

Train No. 32, with one R. P. O. car and four storage cars, leaves Chicago at 1:50 A. M., arriving in New York 26 hours later, and its mail is delivered at 9 A. M. of the second day, over 30 hours after it leaves Chicago.

Flight No. 2 will fly from Chicago at 3 A. M., arriving in New York at noon with 42,000 letters to be delivered downtown by 2 P. M., *saving one business day on* 42,000 *letters.*

Train No. 22, with one R. P. O. car, leaves Chicago at 5:30 P. M., arriving in New York at 5:25 P. M., too late for delivery and its mail is delivered 9 A. M., of the second day, over 38 hours after it leaves Chicago.

Flight No. 4 will fly from Erie at 6 A. M., with the New York mail taken from train No. 22 which passes through Erie at 5:15 and Flight No. 2 will arrive at New York at 10 A. M., to be delivered downtown by noon, *saving one business day on* 42,000 *letters.*

Flight No. 6 will fly from Chicago at 12 o'clock midnight with the mail for Buffalo, Rochester, Syracuse, which has missed train No. 22 at 5:30 P. M. Flight No. 6 will arrive at Erie at 4:30 A. M., transferring its mail to train No. 22, which arrives in Syracuse at 10:45 A. M., for delivery at noon, *saving one business day on* 42,000 *letters.*

Train No. 28, with three R. P. O. cars carrying the heavy letter mail, leaves Chicago at 11:15 P. M., arriving in New York at 7:15 A. M. of the second day, distributing its mail over 32 hours after it leaves Chicago.

FLIGHT No. 8 flies from Chicago at 11 P. M., arriving in New York at 8 A. M. the next morning for distribution 10 hours after leaving Chicago, *saving one business day on* 42,000 *letters.*

FLIGHT No. 10 is to forward mail flown from cities west of Chicago. This mail could be flown by air, leaving Kansas City at 6:30 P. M., leaving St. Paul, Minneapolis at 7:00 P. M., leaving St. Louis at 8:00 P. M., leaving Chicago at 11:00 P. M., arriving in New York at 8:00 A. M., the next morning, *with* 42,000 *letters advanced one business day.*

FLY BY NIGHT THROUGHOUT YEAR

Now, as to how it will be possible to have dependable service for night flying. We believe that the following plan, carefully worked out in detail, will make night flying throughout the year possible. We have prepared cost estimates of this proposed plan and the cost is not as high as one might imagine. On a route from New York to Chicago the contractor must be able to get from the government a contract for a reasonable period of time such as the four year period now given on mail star routes. This four year contract period will enable the contractor to lease and prepare suitable landing facilities at the terminal cities and the divisional points, and to provide adequate planes and aids to navigation.

The distance by air is approximately 780 miles. The route would be divided into three divisions, and the mail changed to a fresh plane fully serviced with a fresh pilot at each divisional point. The division fields would be equipped with storage hangars and work shops. Between the divisional points emergency landing fields would be leased by the contractor and maintained in a usable condition for emergencies. These would be from 15 to 25 miles apart or within possible gliding distance if a 5,000 foot altitude was maintained.

A series of powerful Beacon lights would be established along the entire route including exceedingly large lights at the terminal fields and somewhat smaller, but still very powerful Beacon lights, at each of the emergency landing fields. All of the fields would be illuminated by a series of flood lights or indicator lights which would show the pilot where to make a landing, the direction and velocity of the wind, and the limits of the field. It would not be necessary for these lights to burn steadily all night long, several methods of switching them on and off automatically or semi-automatically, having been considered. With this system of illumination it will be possible for a pilot under average weather conditions to always be able to steer his course visually by following the Beacon lights.

IN CONSTANT RADIO COMMUNICATION

It is realized that in fog and under stormy weather conditions the range of visibility will be greatly decreased. For this reason we have figured on the contractor installing in each plane a radio telephone receiving set and a radio telegraph sending set. We have figured on establishing a radio compass station at each terminal and division field and at one field midway between the division points, in other words, about every 125 miles. The telegraph sending set in the plane would be fitted with an automatic sender which would send out the code number of the plane at regular intervals of say every three minutes. The compass stations between which the plane was flying would receive these automatic signals and keep tally of the location and course of the plane. If the pilot found or believed he was off the course he would move his automatic sender to ask the compass station for the proper bearing to get back on his course. He would receive their reply by telephone. This system of using an automatic telegraph sender and receiving by telephone will enable the pilot to

get the full use of his radio gear without distracting his attention from piloting his ship.

We have figured on the contractor using new modern planes which will carry at least 1,000 pounds of mail, with a cruising speed of 100 miles per hour, and a high speed of 20 to 25 miles faster. We estimate that the cost of operating this service, based on a four years' contract, flying four planes Eastbound and four planes Westbound daily will be approximately $1,863,000 per year. The four Eastbound planes will expedite 210,000 letters a day, and the four Westbound planes another 210,000 letters a day, or saving a business day on 420,000 letters a day. Flying on 310 business days a year would mean 130,000,000 letters per year, and the cost would be less than 1½ cents per letter. This works out that the total cost per mile flown is about $1.00, which is at the rate of one mill per mile per pound.

Basic Figures of Contract

Now the figures that I have given above indicate what can be reasonably expected in the future. But it must be remembered that in organizing as long a route as this, it will be inexpedient for either the contractor or the Post Office Department to undertake a contract of such magnitude as four planes each way daily. We have therefore prepared alternative figures on flying one plane each day each way. In making up this estimate we have left in all the costs of all the aids to navigation given in the larger estimate, including emergency landing fields, Beacon lights, and radio compass stations, so that the costs given will cover day and night flying. We estimate that flying one plane each way each day between New York and Chicago will cost approximately $800,000 a year based on a four year contract. With a 1,000 pound load, the $800,000 yearly cost, plus 5%, gives a rate of 1¾ mills per mile per pound or 4¼ cents per mile per cubic foot of cockpit mail space in a plane. On this basis of one round trip per day approximately 25,000,000 letters would be expedited yearly from New York right through to Chicago, and the cost per letter, $800,000 divided by 25,000,000 letters, would be a little over 3 cents per letter, that is if all the mail is *through* mail. If the flight is arranged so that *way* mail can be carried either between intermediate cities or advancing part of the mail from trains which had already carried it some of the distance, approximately 50,000,000 letters per year could be expedited, and the cost would be only about 1 6/10 cents per letter.

These figures show that for less than $1,000,000 a year approximately 50,000,000 letters could be accelerated one business day. The yearly deficit of the Post Office Department is considerably over $100,000,000, thus, for less than 1% of the yearly cost of the Post Office Department it is possible to save a whole business day on 50,000,000 letters. Surely the advantage to the business community in such an acceleration is worthwhile.

Passenger Traffic Natural Growth

We have based our figures on a route from New York to Chicago, believing that such a route should be the first one to be established, and further believing when such a line is established and successfully operated for a sufficient period of time to demonstrate its feasibility that extensions will be rapidly made and additional trunk lines established. These trunk lines once established and successfully operated will prove such a boon to the commercial communities of the cities, both at the terminals and along the route, that after

they have been in operation for a fair period the communities would never allow them to be discontinued. The service will grow and gradually expand to carrying express matter. Then, from time to time, when the general public realizes the punctuality and reliability of the service they will seek the expansion of the line for passenger traffic. But this passenger traffic will be a natural growth for those whose time is so valuable that they can afford the additional cost of aerial transportation, and the sales expense in obtaining such passengers will be a reasonable percentage of the gross receipts.

To bring this matter to a head we must look to Congress to pass legislation authorizing the Postmaster General to let contracts with private contractors for carrying the mail by air, allowing a contract period of not less than four years and at rates which will enable the contractor to put in and maintain the aids to navigation he will require for safe and punctual night or day flying. These rates must be adequate for him to buy the best of flying material. Rates should not be less than 2 mills per mile per pound or the equivalent space rate of 5 cents per mile per cubic foot of mail compartment in a plane. There are bills now before the Post Office Committee in the House which will be entirely suitable if modified as above in the matter of rates and methods of payment. It would not be necessary for the Government to make any gift, grant, or bonus to the contractor but only to insure him a fair return for the service to be performed, remembering that the routes must be operated through the entire year, operated punctually and dependably.

After the main trunk line for an air mail route from New York to Chicago is well established, branch lines would be put in. A feeder line to Detroit serving Detroit and adjacent cities would probably be one of the first branch lines established. Feeder lines would also be established from the main route to Boston and New England, to Philadelphia, Baltimore and Washington, and from Chicago to St. Louis, Kansas City, Omaha, Minneapolis and St. Paul. Thus it will be possible for the manufacturers of Detroit to have their mail posted as usual at 5 P. M. or after, but delivered early the next day in the larger cities from New England to the Missouri, and the cost will not be excessive.

AERONAUTICAL LEGAL PROBLEMS

What Are an Aviator's Rights?—What Are His Liabilities?—What Regulation Is Desirable?—Why Uniformity Is Indispensable—Federal Law Urged.

By William P. MacCracken, Jr., of Chicago, Chairman, Aviation Committee, American Bar Association.

There are three legal questions which the business man about to invest in an aeronautical enterprise wants to have answered:

First: What are an aeronaut's rights?

Second: What are an aeronaut's liabilities?

Third: What governmental agencies have power to regulate aeronautics, and to what extent?

Other questions may be raised but if definite, satisfactory answers could be given to these three questions, a serious impediment to the advancement of commercial aeronautics in this country would be removed.

These questions are so interrelated that they will not be considered separately. "What are an aeronaut's rights?" may, in turn, be divided so as to present several different rights, such as his right to compensation for passengers and freight carried, or for services performed; his right to recover for injuries attributable to the negligence of another aeronaut, or the negligence of the manufacturer of his aircraft, but the question which is of primary importance involves his right to fly through space over property of another, and it is this particular right which presents the most serious legal problem.

Those who challenge an aeronaut's right to fly over another's property rely upon the common law maxim, *Cujus est solum ejus est usque ad coelum*, which freely translated means that the owner of the soil owns to the sky.

It was handed down from the Roman law. A literal application of this maxim would prove a most serious handicap to commercial aeronautics. So far, it has not been passed upon by any court of last resort in this country in a case involving flight by aircraft, though it has been quoted in cases involving overhanging branches, overhanging eaves, telephone and telegraph wires, and thrusting one's arm over another's land. All of these acts appear to have been done at a height low enough to interfere with the land's use by its owner. As far back as 1815, Lord Ellenborough, in the case of *Pickering* v. *Rudd*, 4 Camp. (Eng.) 219, said:

> "Nay, if this board overhanging the plaintiff's garden be a trespass, it would follow that an aeronaut is liable to an action of trespass *quare clausum fregit* at the suit of the occupier of every field over which his balloon passes in the course of his voyage."

In contending for a right or easement of flight, as it is sometimes called, it may as well be conceded that this right would have to be exercised so as not to interfere with the land's use by its owner.

Law Should Be Adjusted

One of the theories of our common law is that it should adjust itself to changing conditions. At the time this maxim was inherited from the Roman law, travel by air not only was unheard of, but it was undreamed of, except in the mythology of the Greeks.

It is inconceivable that a court of last resort in this country would blindly follow this maxim, without applying a test as to its reasonableness.

In determining whether or not this maxim should be modified or construed so as to permit flying over another's property without the owner's consent, the question should first be approached from the point of view of the property owner. His land would not be damaged by permitting aircraft to fly over it any more than it is damaged by permitting automobiles to pass in front of it along the public highway, nor would the owner's use of the land be affected, if the right of passage of aircraft was limited to a height sufficient not to interfere with the owner's use of his property.

Considered from the standpoint of public convenience and necessity no argument is needed in support of a modification of this theory of property rights in air space. Our common law has always recognized as paramount the public's right to travel, and when a highway is obstructed the traveling public may go upon private property in order to avoid the obstruction and to continue upon their journey. Certainly if public necessity will excuse an act which does not interfere with an owner's use of his property and may cause actual pecuniary loss, it would seem reasonable that the public's interest in air travel would warrant a limitation of this maxim which would permit an aeronaut to fly over another's land without being regarded as a trespasser.

Right to Fly Over Another's Land

Public opinion would seem to support this contention when one considers that during the years 1920 and 1921 aircraft traveled approximately 12,000,000 miles in the United States without a single property owner presenting a claim for aerial trespass. This year in the State of Pennsylvania a complaint charging aerial trespass was filed against the "Windy" Smith Flyers before a Justice of the Peace. It was conceded on the trial that the defendants had flown over the complainant's land at a height of 300 feet; they were fined in the Justice's Court but on appeal this judgment was reversed. From the judgment of reversal an appeal has been taken which is still pending.

Another reason for recognizing the right to fly over another's land is the difficulty of determining an aircraft's course through the air. While this reason, standing alone, would not be controlling and should not be considered if there was any real injury to the land, the fact that in the vast majority of cases the exact course of the aircraft could not be determined with any degree of certainty, should add weight to the arguments in favor of the right of flight over private property.

Several of the writers on this subject have suggested various methods by which this right of flight could be acquired in the event the courts should hold that it did not exist at common law. Judge Lamb, former solicitor for the Department of Commerce, has suggested a statutory condemnation by Act of Congress of all the air space over privately owned property, giving the owners a right of action against the United States for any actual damage they might be able to prove. As it would be impossible to prove actual damages, the

net result would be that the right would be acquired without expense to the government. Major Johnson, legal advisor to the Chief of Air Service, U. S. A., has suggested that the right be acquired by a federal constitutional amendment.

The conference of Commissioners on Uniform State Laws in their draft of the Uniform State Aviation Act adopted at San Francisco August 7, 1922, make the following declarations:

> "Section 3 (Ownership of Space). The ownership of the space above the lands and waters of this state is declared to be vested in the several owners of the surface beneath subject to the right of flight described in Section 4.
>
> "Section 4 (Lawfulness of Flight). Flight in aircraft over the lands and waters of this state is lawful unless at such a low altitude as to interfere with the existing use to which the land or water or the space over the land or water is put by the owner, or unless so conducted as to be imminently dangerous to persons or property lawfully on the land or water beneath."

This declaration when enacted by state legislatures cannot be held to create any right which did not exist as common law but merely to state what the legislators believe to be the common law, because if the ownership of the surface carries with it the exclusive right to the use of all of the space above it, the legislative grant of a right of flight through this space would constitute a taking of property without due process of law.

It would therefore seem as though the maxim *Cujus est solum est usque ad coelum* should be so interpreted as to permit a passage through space over privately owned land at a height and in a manner which will not interfere with the use to which the land is put by the owner.

Aviator's Liability for Damage

There are many more phases to the question of an aeronaut's liabilities than there are to the question of his rights. First of all, there is his liability for damage to property and injury to persons upon the ground. Next, there is his liability to his passengers, or to the owner of the goods transported by him. There is also his liability to his employees, and finally, his liability to other aeronauts.

Considerable has been written upon the subject of liability for damage to persons and property upon the ground. Some authors have expressed the opinion that the ordinary rules of negligence should govern, in which case it would be incumbent upon the person injured to prove that the injury suffered was caused by the negligent act of the aeronaut. In defense, the aeronaut, in addition to rebutting the prima facie case of negligence, could rely upon contributory negligence or the doctrine of *vis major*. Other writers have advocated the application of the maxim *res ipsa loquitur* which relieves the plaintiff from proving negligence but permits the defense of contributory negligence, *vis major*, or the negligence of an independent third party. Still others have advocated the principle of absolute liability for all damages, the same as applied to one who keeps a wild beast upon his premises. The only case on this subject is that of *Guille* v. *Swan*, 19 Johns (N. Y.) 381, decided in 1822, in which a balloonist was held liable for damage caused by the fall of a balloon on the plaintiff's land and also for damage caused by a crowd which was attracted onto the plaintiff's land by the defendant's fall. The reasoning of the court

in the Guille case makes that case applicable only to free balloons. Chief Justice Spencer said:

> "I will not say that ascending in a balloon is an unlawful act, for it is not so; but it is certain that the aeronaut has no control over its motion horizontally; he is at the spirit of the winds and is to descend when and how he can; his reaching the earth is a matter of hazard."

Aircraft Not "Dangerous Instrumentality"

When one considers that the U. S. aerial mail has flown daily for over a year from New York to San Francisco and from San Francisco to New York without a serious accident, it can hardly be held that aircraft are a dangerous instrumentality, or their descent "a matter of hazard."

Because of the analogy between navigation of the air and navigation of the seas, some writers have suggested that the rules of admiralty law, rather than the common law rules should apply. However, in the case of *Crawford Brothers No. 2*—215 *Federal 269*, decided in 1914, the United States District Court for the Western District of Washington held that aircraft were not the subject of admiralty jurisdiction. The laws thus far enacted by the various state legislatures have not been uniform in fixing the rule of liability, but the Uniform Aviation Act as approved by the Commissioners on Uniform State Laws provides:

> "Section 5. (Damage on land.) The owner of every aircraft which is operated over the lands or waters of this State is absolutely liable for injuries to persons or property on the land or water beneath, caused by the ascent, descent or flight of the aircraft, or the dropping or falling of any object therefrom, whether such owner was negligent or not, unless the injury is caused in whole or in part by the negligence of the person injured, or of the owner or bailee of the property injured. If the aircraft is leased at the time of the injury to person or property, both owner and lessee shall be liable and they may be sued jointly or either or both of them may be sued separately. An *aeronaut* who is not the owner or lessee shall be liable only for the consequences of his own negligence. The injured person shall have a lien on the aircraft causing the injury to the extent of the damage caused by the aircraft or objects falling from it."

In support of this high degree of liability its proponents rely upon the difficulty of proving negligence and the inability of the injured party to protect himself or his property. On the other hand it should be remembered that "hard cases make bad law." When a cyclone blows the roof of a house across the street and through a storekeeper's window the public naturally sympathizes with the owner of the store and the owner of the house, but there is no reason why the owner of the house should respond in damages to the storekeeper and the law does not require him to do so. Likewise, if an aircraft should be wrecked by a cyclone there is no reason why persons on the ground who sustained damage by reason thereof should be given a cause of action either against the owner or the operator of the aircraft. This rule should therefore be modified at least to the extent of recognizing the principle of *vis major*. It has already been pointed out that aircraft have developed beyond the point where they can be classed with wild beasts and highly dan-

gerous instrumentalities and difficulty may be encountered in sustaining this legislative rule of liability.

Authors and legislators give little, if any, attention to the liability of an aeronaut for injuries to his passengers or to shippers for property damaged in transit. In all probability this is due to the "fireside" conception of justice that one who risks his person or his property in the air assumes the risk and is therefore not entitled to compensation for loss, or else because the doctrine which is applied to common carriers is regarded as sufficiently stringent to meet the requirements of justice. In many instances passengers and shippers have been required to sign contracts limiting or waiving their claims for damages in the event of injury to themselves or their property. These contracts in all probability will ultimately be construed by the courts according to the same principles which they have applied to similar contracts involving transportation by land. More than likely the same rules of law will be applied to common carriers by air as are applied to other common carriers. These rules are not uniform but the various underlying principles are well settled in our several states. It must be borne in mind that the term common carrier itself has been construed differently in different states and that every carrier for hire is not necessarily a common carrier, and therefore not subject to the particular liabilities imposed upon them.

Compensation for Injuries

Compensation for injuries suffered by employees will undoubtedly be covered by amendments to the Workmen's Compensation Acts in the various states where these acts are not already broad enough in their scope to cover individuals employed in aerial transportation. One case involving injury to an employee of an aviation company has already been passed upon by the court of appeals of New York state, *In re Reinhardt, 232 N. Y.* 115. The question there involved was not whether the employees' remedy was at common law, or under the New York statute, but whether his remedy was under the Federal Employer Liability Act because the injury was sustained while the claimant was repairing a hydroplane moored upon navigable waters of the United States. The State Court held the Federal Act applied and denied recovery in the State Courts. This case will again be referred to in discussing the power of governmental agencies to regulate aeronautics.

The Illinois Workmen's Compensation Act applies to carriage by land or water but makes no reference to carriage by air. It also applies to the distribution of any commodity by horse-drawn or motor-driven vehicle, but it could hardly be held that this was broad enough to cover an aeronautical enterprise. The question as to whether employees of an aviation company are covered by the Illinois Act has been raised but, at the present time, remains undetermined. In states which have no Workmen's Compensation Act, or where the scope of such act is not broad enough to cover employees of an aeronautical enterprise, the ordinary common law rules relating to assumption of risk and the fellow servant doctrine will be applied, and it will be only a question as to whether the claimant will have to prove negligence on the part of the employer, or if the courts will presume negligence because of the difficulty of proof and the inability in some cases of the courts to comprehend what constitutes negligence in relation to aeronautics.

While this last statement may be regarded as casting reflection upon the Bench, it is not so intended. In many instances facts which constitute negligence in ordinary cases are, as a matter of fact, factors of safety in aero-

nautics. The most familiar example is that of speed. Operating railroad trains, street cars, automobiles and other vehicles at a high rate of speed has always been evidence of negligence on the part of the operator, and operating at a low rate of speed has been accepted as evidence of due care. In aerial navigation speed is a factor of safety. One of the standing jokes of the Air Service during the war had to do with the fond parent who cautioned a cadet learning to fly, to "fly low and slow."

What Constitutes Care

There are differences of opinion among pilots themselves as to what constitutes due care and what constitutes negligence, and until aerial navigation is more a matter of common experience, it will be difficult for courts to determine what constitutes negligence and what risk can be regarded as having been assumed.

These same problems are involved in determining the liability of one aeronaut to another. Collisions in the air have not been numerous, and unless attributable to weather conditions such as fog or the negligence of one or both pilots in stunting, it is almost impossible to determine with any degree of certainty which pilot was at fault. In this connection it might be worth while to call attention to data on aircraft accidents prepared by the Aeronautical Chamber of Commerce of America and published in the Aircraft year book for 1922, pp. 37-41, both inclusive. This table accounts for 114 accidents and classifies their causes as follows:

"Due to—	
Piloting	49
Poor Fields or Lack of Them	20
Lack of Weather Data	4
Lack of Route Data or Flying Limitations	10
Inspection—	
Faulty Craft	4
Faulty Engine	9
Faulty Accessory	9
Stunting	29
Collision in Air	2
Carelessness on Field	8
Unknown	8

In examining the remarks in connection with the table it will be noted that some of the accidents were attributable to more than one cause, which accounts for the fact that the total under the recapitulation of causes exceeds the number of accidents by thirty-eight. There were only two collisions in the air and both of these occurred in connection with stunting.

Governmental Regulation of Aeronautics

Governmental regulation of aeronautics presents a most interesting legal problem. As heretofore pointed out, state legislatures have already enacted some regulatory legislation; in California, Connecticut, Kansas, Oregon and Maine the acts are fairly comprehensive, while in New Jersey, Minnesota, Indiana, Montana, North Carolina and Utah the scope of the legislation is very limited, dealing only with such subjects as the use of aeroplanes in hunting, Montana Laws, 1921, chapter 238, North Carolina Laws of 1919, chapter 38, and the acquisition of aviation fields by condemnation or other-

wise, Indiana Laws of 1920, chapter 165, Utah Laws of 1921, chapter 38. New Jersey and Minnesota prohibit flying in certain localities at altitudes of less than two thousand feet.

Numerous city councils acting under the police power have adopted ordinances regulating aerial navigation in the air space within their respective city limits. Their validity is yet to be tested in the courts. In the meantime Congress has failed to pass any law on this important subject, notwithstanding the fact that several bills have been introduced at each session during the last four years and the aeronautical interests have exerted their influence to obtain some federal legislation on the subject. So far the controversy has hinged upon the extent of the Federal Government's power to regulate aeronautics in all of the space over the United States, its territories and the territorial waters adjacent thereto. For a time there was some question as to whether or not sovereignty of the air over any country in time of peace would be recognized by international law. But the development and importance of aeronautics during the World War made necessary the recognition:

> "(1) of the principle of the full and absolute sovereignty of each state over the air above its territory and territorial waters, carrying with it the right of exclusion of foreign aircraft; (2) of the right of each state to impose its jurisdiction over the air above its territory and territorial waters"

as adopted by the International Air Navigation Convention, which was held in conjunction with the Peace Conference.

This declaration of principle applies only to International Law and is not controlling as between the several states and the Federal Government. This is particularly true since the United States has not adopted the air convention because of its relation to the treaty of Versailles. There can be little doubt, however, but that the principle of sovereignty of the air will be recognized by the United States Supreme Court once that question is presented to it for determination. This being true, the control of the air space over the United States is vested in the respective states, except insofar as the Federal Government may exercise control over it under the powers delegated to it by the states in the constitution and amendments thereto.

Bar Association Urges Law

As previously noted, a constitutional amendment vesting in the Federal Government power to regulate the use for air travel of all space over the United States has been suggested. However, the American Bar Association at its meeting in August, 1922, adopted a recommendation

> "That until Congress has enacted legislation fostering and regulating aeronautics and until the Supreme Court has determined the extent of federal control over aeronautics no further consideration be given to the question of a constitutional amendment to vest exclusive jurisdiction over aeronautics in the federal government."

The bills which have been introduced in Congress have been drafted under one or more of the following clauses of the federal constitution: The interstate commerce clause; the treaty making clause; the admiralty clause; the post roads clause; the national defense clause and the clause granting jurisdiction over limited areas acquired or purchased from the various states.

While all of these clauses may be helpful in reaching the conclusion that

Congress may assume for all practical purposes exclusive jurisdiction over the regulation of aeronautics, undoubtedly the greatest power comes from the grant contained in the interstate commerce clause and the treaty making clause. To exercise the latter requires the ratification of a treaty with some foreign country which would make necessary federal legislation on the subject of intrastate aerial navigation. While such a treaty will undoubtedly be ratified in the course of time, there is no such treaty now in existence and therefore the most logical procedure would be the exercise of the power under the interstate commerce clause.

Congress Empowered to Regulate

In the *Shreveport case, 234 United States,* page 342, the United States Supreme Court in discussing the power under the interstate commerce clause said:

> "Congress is empowered to regulate,—that is, to provide the law for the government of interstate commerce; to enact 'all appropriate legislation' for its 'protection and advancement' (The Daniel Ball, 10 Wall. 557, 564, 19 L. ed. 999, 1001); to adopt measures 'to promote its growth and insure its safety' (Mobile County v. Kimball, 102 U. S. 691, 696, 697, 26 L. ed. 238-240); 'to foster, protect, control, and restrain' (Second Employers' Liability Cases (Mondou v. New York, N. H. & H. R. Co., 223 U. S. 1, 47, 53, 54, 56 L. ed. 327, 345, 347, 348, 38 L. R. A. (N. S.) 44, 32 Sup. Ct. Red. 169, 1 N. C. C. A. 875). Its authority, extending to these interstate carriers as instruments of interstate commerce, necessarily embraces the right to control their operations in all matters having such a close and substantial relation to interstate traffic that *the control is essential or appropriate to the security of that traffic, to the efficiency of the interstate service,* and to the maintenance of conditions under which interstate commerce may be conducted upon fair terms and without molestation or hindrance. As it is competent for Congress to legislate to these ends, unquestionably it may seek their attainment by requiring that the agencies of interstate commerce shall not be used in such manner as to cripple, retard, or destroy it. The fact that carriers are instruments of intrastate commerce, as well as of the interstate commerce, does not derogate from the complete and paramount authority of Congress over the latter, or preclude the Federal power from being exerted to prevent the intrastate operations of such carriers from being made a means of injury to that which has been confined to Federal care. Wherever the interstate and intrastate transactions of carriers are so related that the government of the one involves the control of the other, it is Congress, and not the state, that is entitled to prescribe (352) the final and dominant rule, for otherwise Congress would be denied the exercise of its constitutional authority, and the state, and not the nation, would be supreme within the national field."

In the case of *R. R. Com. of Wis.* v. *C. B. & Q. R. R. Co.,* U. S. Adv. Ops. 1921-22, 236, the court sustained an order of the Interstate Commerce Commission which was much wider than the order in the Shreveport case. Chief Justice Taft in the course of his opinion said:

"Commerce is a unit and does not regard state lines, and while, under the Constitution, interstate and intrastate commerce are ordinarily subject to regulation by different sovereignties, yet when they are so mingled together with the supreme authority, the nation, can not *exercise complete, effective control over interstate commerce without incidental regulation of intrastate commerce, such incidental regulation is not an invasion of state authority.*"

Uniform Regulation Indispensable

Uniform regulation of aeronautics is admittedly not only desirable but absolutely indispensable to the effective development of aerial transportation as an instrumentality of interstate commerce. It therefore seems reasonable to believe that legislation for the regulation of aeronautics by the Federal Government would be sustained as constitutional, notwithstanding the fact that its scope would be broad enough to regulate both inter- and intrastate aerial navigation.

An aircraft which is so constructed as to be used both in the air and upon the water, presents a conflict of jurisdiction between the courts of admiralty and the courts of law. This conflict, however, is one which can and should be settled by legislative enactment. The draft of the uniform state aviation law contains the following declaration:

"A hydroairplane while at rest on water and while being operated on or immediately above water should be governed by the rules regarding water navigation; while being operated through the air other than immediately above the water, it shall be treated as an aircraft."

While this dual jurisdiction may give rise to some confusion, it would seem to be the most logical solution of this particular problem.

It has also been suggested that Congress in the exercise of its power to regulate interstate and foreign commerce could require corporations engaging in interstate or foreign aerial navigation to be incorporated under a federal incorporation law. If this suggested legislation is enacted, Congress could confer upon the federal courts exclusive jurisdiction of suits brought by or against such corporations.

CHRONOLOGY OF AERONAUTICAL EVENTS DURING 1922

Jan. 1	Aeromarine Airways establishes 2½ hr. service between Miami, Fla., and Nassau, Bahamas.
Jan. 1	Underwriters' Laboratories, Inc., Chicago, start registry of aircraft.
Jan. 1	The Aeronautical Chamber of Commerce of America, Inc., organized at 501 5th Ave., New York City.
Jan. 5	Navy completes mapping of the Parish of Orleans (New Orleans, La.) in Curtiss RL-6.
Jan. 7	Statue to Colonel Raymond C. Bolling, first officer of American Air Service to be killed by German bullet during the World War, unveiled at Greenwich, Conn.
Jan. 8	Army Air Service personnel at Crissy Field, Presidio, San Francisco, Cal., stage flying circus before 20,000 people.
Jan. 9	Aero Club of America holds 14th Annual Banquet at Hotel Commodore, New York.
Jan. 9	Collier Trophy awarded to Grover C. Loening.
Jan. 9	Lt. John A. Macready, U. S. A. S., Chief Test Pilot at McCook Field, Dayton, O., awarded Clarence Mackay Cup for having accomplished greatest feat in aviation during the year 1921—his record-breaking altitude flight of September 28, 1921.
Jan. 20	Army Air Service personnel at Bolling Field, Anacostia, D. C., holds aerial exhibition.
Jan. 21	5th Group (Observation), Army Air Service, stationed at Luke Field, Hawaiian Department, stages airplane show.
Jan. 28	National City Bank (New York) officials fly from Havana to Miami aboard Aeromarine Airways flying cruiser *"Ponce de Leon"* in 3 hrs. 39 min.
Feb. 4	Lt. C. V. Haynes, U. S. A. S., makes record non-stop flight between Dayton, O., and Washington, D. C., in special DH-4 Messenger ship, trip consuming 2 hrs. 55 min., making rate of travel slightly in excess of 147 mi. per hr.
Feb. 4	Army Air Service personnel at Carlstrom Field, Arcadia, Fla., hold airplane meet.
Feb. 15	U. S. Senate passes Wadsworth Bill (S. 3076) providing for Bureau of Aeronautics in Department of Commerce.
Feb. 21	U. S. Army Semi-Rigid Airship *"Roma"* destroyed with 33 of crew at Langley Field, Va.
Feb. 27	National Vigilance Committee, Associated Advertising Clubs of the World, issues warning against fake stock schemes, affecting aviation.
Feb.	U. S. Chamber of Commerce at 9th Annual meeting, endorses legislation for national air laws.
Mar. 6	N. D. Trinler, in Longren biplane, with 60 H.P. Lawrance engine, ascends 17,900 ft. in 140 min. at Topeka, Kans.

Mar. 6	Major Gen. Mason M. Patrick, Chief of Air Service, makes inspection of Army Air Service stations in the Southwest, via a DH-4-B. airplane.
Mar. 15	Goodyear A C blimp successfully tested at Akron, O.
Mar. 24	Two Aeromarine 11-passenger flying cruisers establish record for flight between Key West and Havana, covering 100 mi. in 55 min.
Mar. 27	Prof. J. G. Butler, Department of Agriculture, makes airplane flights at Kelly Field, San Antonio, Tex., with Lt. F. B. Booker as pilot, with view to determining origin of spore of wheat rust in this country.
Mar. 27	Commercial Aeronautical Association of the 7th Army Corps Area holds its annual convention at Sioux City, Ia.
Mar. 30	Capts. Sacadusa and Continho, Portuguese aviators, start cross-Atlantic flight from Lisbon to Pernambuco, Brazil.
Apr. 1	Aeromarine U-8-D motor successfully completes U. S. Navy 292 hr. test at Keyport, N. J.
Apr. 6	Bombing record for Aberdeen Proving Grounds, Md., made from Army Airship C-2, piloted by Lt. Max F. Moyer and Master Sgt. Wm. E. Fitch, U. S. A. S., with Capt. E. R. Stribbling, Ordnance Dept., as bomber. Seven hits out of 8 bombs dropped recorded; bombs dropped from altitude of 2,000 ft. on concrete block, 200 by 200 ft.
Apr. 6	Two 5-ship formations from Mather Field, Mills, Cal., welcome General Joffre upon his arrival at San Francisco.
Apr. 17	Clifford Webster, in Loening Flying Yacht with passenger, flies from Palm Beach, Fla., to New York in 9 hrs. 56 min. flying time, 1 stop.
Apr. 21	Woman's life is saved by Aeromarine flying boat carrying physician from Miami, Fla., to Little Abasco Island in the Bahamas in 1½ hrs.
Apr. 29	Flying meet at Wichita Falls.
Apr. 30	Spring flying meet at Curtiss Field, Garden City, L. I.
Apr. 30	Twenty airplanes compete in the various races at the Spring flying meet at Curtiss Field, Mineola, L. I., N. Y., held under the auspices of the Rotary Club of New York, Aero Club of America, the Aeronautical Chamber of Commerce, and Curtiss Aeroplane & Motor Corporation.
May 4	Fastest time ever made between Kelly Field, San Antonio, Tex., and Pacific Coast negotiated by Lts. James H. Doolittle and Leland S. Andrews, U. S. A. S., 1,200 mi. being covered in 13 hrs. 25 min.
May 7	464th Pursuit Squadron, Organized Reserves, 100 acre tract used as flying field at Fort Benjamin Harrison, Ind., dedicated to the memory of Lt. Carl Shoen, an Indianapolis boy, who at the time he was shot down in the World War in 1918 was credited with seven enemy planes.
May 9	*"Santa Maria,"* Aeromarine 11-passenger flying cruiser, arrives in New York from Havana, Cuba, with 9 passengers—17 hrs. 35 min. flying time.
May 12	Boston Airport provided by State of Massachusetts.

May 13	Five airplanes from Paranaque Beach, Manila, P. I., led by Major B. Q. Jones, U. S. A. S., Air Officer of Philippine Department, greets Prince of Wales on arrival at Manila.
May 14	136th Squadron (Observation) Tennessee National Guard holds its first flying meet on Blackwood Field, Nashville, Tenn.
May 14	Aeromarine Airways opens New York Division flying operations.
May 14	Aeromarine flying boat *"Mendoza"* carries 27 passengers from Keyport, N. J., to New York and return.
May 21	Flying Circuit for the benefit of the Army Relief Fund held at Crissy Field, San Francisco, Cal., by Army Air Service personnel.
May 23	Three DH-4-B airplanes from Mitchel Field, L. I., N. Y., bomb New York with 20,000 paper bombs, advertising Citizens' Military Training Camps.
May 24	Master Sgt. Chester W. Kolinsky, 90th Squadron, at Kelly Field, San Antonio, Tex., makes parachute jump from altitude of 10,600 ft.
May 26	Major Roy S. Geiger, U. S. M. C., flies from Quantico, Va., to Pensacola, Fla., 952 mi. in 11 hrs. 15 min.
May 29-June 6	Chicago Tribune's Curtiss *"Seagull"* makes flight from Long Island for timber patrol service beyond Quebec.
May 30	Flying Club of Baltimore holds annual meet.
May 31	Major Oscar Westover, U. S. A. S., with 1st Lt. Carlton F. Bond as aide, wins first place in the National Balloon Race from Milwaukee, Wis., 866.5 mi.; H. E. Honeywell, 553.4 mi., second, and Lt. W. F. Reed, Navy, 431 mi., third.
June 1	Amundsen leaves Seattle, Wash., on Polar Cruise with Larsen and Curtiss planes.
June 5	Los Angeles to Catalina Air Service opens with 2 Aeromarine-Navy HS-2-L flying boats.
June 10	Brunswick, Me., scene of official opening of first municipal airplane landing field in that State.
June 12	Capt. A. W. Stevens, U. S. A. S., at McCook Field, Dayton, O., makes record parachute jump from 24,206 ft. from a supercharged Martin Bomber.
June 12	Naval seaplane utilized by scientists from Smithsonian Institution in mollusk research work in Florida waters, completing as much in a few days as would have required a year under old methods.
June 15-17	Aero Club of Monmouth, Ill., holds aero meet; 61 participants in 31 airplanes compete.
June 16	Lt. Clayton Bissell, U. S. A. S., completes first of four successful cross country night flights from Bolling Field, Anacostia, D. C., to Langley Field, Va., and return.
June 16	In presence of officers of the Army, representatives of foreign governments and civilian engineers, Henry Berliner, of Washington, D. C., piloting a helicopter on which he and his father, Emil Berliner, had long been experimenting, makes vertical flight.
June 17	Portuguese aviators arrive in Brazil.

June 18 Thirty thousand people witness bombing of schooner *"Navided"* off Fort Crockett, Galveston, Tex., by Army Air Service pilots from Ellington and Kelly Fields, Tex.

June 18 Mosaic Map of Battlefield of Gettysburg made by U. S. Marine Corps.

June 19 Annual Cross Country Airplane Race, Turin, Allessandria, Bologna, Luge, Ravenna, Venice, Milan and Turin, Italy; 39 start; 15 finish.

June 20 Lt. Delmar H. Dunton, U. S. A. S. pilots a DH-4-B airplane from Kelly Field, Tex., 1,350 mi. to Selfridge Field, Mt. Clemens, Mich., 15 hrs. 5 min.

June 20 Army Air Service pilots from Kelly Field, San Antonio, Tex., aid in relief work along Mexican border when torrential rains in the mountains around Monterey caused by an overflow of the Rio Grande River from 20 to 25 mi. wide in places.

June 24-27 International Flying Meet at Brussels.

July 1 Army Air Service personnel at Ellington Field, Houston, Tex., save the Government thousands of dollars for transportation expenses when activities of that field are transferred to Selfridge Field, Mt. Clemens, Mich. Flying 21 airplanes not built for long cross-country flights, the pilots cover 1,600 mi. to Selfridge Field in 16 hrs. 10 min. actual flying time.

July 1 At Friedrichshaven, Germany, work is started on Zeppelin airship for U. S. Government.

July 1 Aeromarine Airways, Inc. opens flying boat passenger service between Detroit, Mich., and Cleveland, O.

July 1 Aeromarine flying boats open New York-Atlantic City Air Service.

July 3 Thirty-five thousand cubic ft. capacity balloon, piloted by Major Harold A. Strauss and Lt. Richard E. Thompson, U. S. A. S., leaves McCook Field, Dayton, O., at 7:30 p. m. July 3d, and flying throughout the entire night lands at West Moreland, Tenn., at 7:30 a. m. July 4th.

July 3 Taking off from Kelly Field, San Antonio, Tex., at 5:15 a. m., Lts. James H. Doolittle and Leland S. Andrews, U. S. A. S., piloting a DH-4-B airplane, land at Jacksonville, Fla., 1,025 mi. distant, at 5:40 p. m. of the same day, stops being made at Ellington Field, Houston, Tex., and Pensacola, Fla.

July 6 Naval seaplane responds to call for help from burning fishing boat off North Island, San Diego, and 3 of seaplane's crew rescue 5 fishermen clinging to wreckage.

July 14 Aeromarine Airways, Inc., opens Great Lakes Division operating 11-passenger Aeromarine cruisers on double daily flying boat service between Cleveland and Detroit.

July 15 John M. Miller in Chicago Tribune's Curtiss *"Seagull"* starts timber cruising flight at Shelter Bay, Quebec.

July 16 U. S. Air Mail completes 1 yr. on transcontinental route 1,750,000 mi., carrying 49,000,000 letters, without serious accident.

July 17 Naval planes take aerial photos to aid in determining location of reefs of Lahaina, Maui, Hawaii.

July 20 Mrs. Benedict Crowell christens Aeromarine 11-passenger flying cruiser *"Buckeye"* at Cleveland.

July 21	Aeromarine flying boat *"Wolverine"* establishes speed record between Cleveland and Detroit covering 117 mi. in 82 min. with 7 passengers.
July 21	Army Airship C-2, after making successful night flight from Aberdeen Proving Grounds, Md., to Philadelphia, Pa., and return, negotiates the following night a flight from Bolling Field, D. C., to New York City, and return to Aberdeen Proving Grounds.
July 21	Aerial photos taken by Navy aid in successfully salvaging British vessels S. S. *"Valdura,"* aground off Kalihi, Hawaii.
July 26-29	Flying meet at Tarkio, Mo.
July 27	Dirigible A-4 of the Army Air Service arrives at Scott Field, Belleville, Ill., after flying 1,100 mi. from Langley Field, Va.; 2 stops made en route.
July 30-31	Thousands witness Colorado's first air meet at Curtiss-Humphreys Field, Denver.
July	Keel of Navy ZR-1 rigid airship laid at Lakehurst, N. J.
Aug. 1-15	104th Squadron, Maryland National Guard holds first annual encampment at Langley Field, Va.
Aug. 1	Eighty-seven radio equipped airplanes start fire patrol over national forests.
Aug. 2	Fourth Air Squadron, 1st Brigade, U. S. Marine Corps, gives aerial exhibition, Port-au-Prince, Haiti, for High Commissioner and President of Republic.
Aug. 2	Capt. W. P. Hayes and Master Sgt. C. W. Kolinsky, U. S. A. S., fly DH-4-B plane from Kelly Field, San Antonio, Tex., to New Orleans, La., 560 mi. in 4½ hrs.
Aug. 2	Ascending 23,350 ft. in a Martin Bomber, Lt. Leigh Wade, U. S. A. S., test pilot at McCook Field, Dayton, O., breaks his own record for airplane carrying 3 passengers.
Aug. 3	Detroit News experimental radio set installed in Aeromarine flying boat *"Buckeye"*; passengers hear concert while in flight between Detroit and Cleveland.
Aug. 3	Lt. Clayton Bissell, U. S. A. S., makes night flight from Bolling Field, D. C., to Mitchel Field, L. I., N. Y. and return in DH-4-B plane.
Aug. 6-20	Soaring and gliding competition at Clermont-Ferrand, France.
Aug. 6	DeMuyter of Belgium covers 870 mi. in a free balloon, winning Gordon-Bennett International Balloon Race from Geneva, Switzerland.
Aug. 7	Lts. Hine and Webber, U. S. A. S., return to Rockwell Field, San Diego, Cal., from a 4,000 mi. mapping trip, covering Las Vegas, Nevada; Denver, Colo.; Salt Lake City, Utah; Fort Sill, Okla.; El Paso, Tex., and Nogales, Ariz. Their total flying time was 39 hrs., embracing 10 flights.
Aug. 7	J. H. James in Gloucestershire *"Bamel"* wins London Aerial Derby at Croydon, England—198 mi. at 177.85 m.p.h.
Aug. 7	Pilot Zimmerman for Germany, in Junkers Seaplane wins Tyrrhenian Cup at Naples, Italy—1,996.3 km., in 17 hr. 8 min. 5⅕ sec.
Aug. 9	Ten Cleveland bankers fly to Detroit aboard Aeromarine cruisers for lunch.

Aug. 9-24	Soaring and gliding competition at Gersfeld, Germany
Aug. 10	U. S. S. *"Henderson,"* with Secretary Denby on board, reaches Sumay, Guam. A Naval F-5-L specially equipped with photographic laboratory takes photograph of ship entering harbor, develops and prints pictures and drops same upon deck of vessel before it comes to anchor.
Aug. 12	Capt. Henry Charles Biard of the Supermarine Aviation Works of Great Britain, wins Jacques Schneider Competition for seaplanes at Naples, Italy. He flew a triangular course of 200 nautical mi. piloting a Supermarine *"Sea Lion,"* Mark II (450 h.p. Napier *"Lion"* engine), in 1 hr. 34 min. 51 3/5 sec.
Aug. 14	Work started on aircraft carriers *"Saratoga"* and *"Lexington."*
Aug. 15	First delivery of automobile by air. Aeromarine flying boat *"Buckeye"* carries Ford car from Detroit to Cleveland in 90 min.
Aug. 16	Two Naval HS-2-L's make flight from Coco Solo, Canal Zone, to Costa Rica and courtesy flights are made with the President of Costa Rica.
Aug. 17	Walter Hinton in H-16 flying boat leaves New York with 4 companions on flight to Rio de Janeiro, Brazil.
Aug. 18	New model airway opened between Dayton, O., and Mitchel Field, L. I., N. Y.
Aug. 18	Fighting Plane Squadron at San Diego, Cal., makes record for aerial combat—maximum 145 hits in 27 sec.
Aug. 18	*"AGA"* beacon (American Gas Accumulator) begins operation at Naval Air Station, Hampton Roads. It makes 18 flashes a min. Its strength is 6,000 candle power. Its optical range is 20 mi. horizontally.
Aug. 21	Lawrence Sperry drops landing wheels and lands with skid device at Farmingdale, L. I.
Aug. 24	Pilot Hentzen, flying a Hanover sail plane, attains an altitude of 1,000 ft. and remains in air 3 hrs. 7 min.
Aug. 25	F. H. Hentzen in Rhön (Germany) Soaring Flight Competition near Gersfeld, breaks then existing records for motorless flying by remaining up in his *"Vampyr"* glider 3 hrs. 10 min.
Aug. 26	Secretary of Navy Denby, returning from Orient, visits Honolulu and within a few hours compasses the three planes of the Navy by flying in an airplane, going aboard a surface craft and then entering a submarine.
Aug. 26	Lt. Brackpapa flies course 4 times at 336.468 m.p.h. Fiat biplane Fiat 700 h.p. engine.
Aug. 27	Fifteen thousand people witness aero meet at Scott Field, Belleville, Ill., in conjunction with Chanute Field, Rantoul, Ill.
Aug. 28	Air Service of the Tennessee National Guard completes summer encampment at Montgomery, Ala., Air Intermediate Depot.
Aug. 28	Army Air Service pilots from Crissy Field, San Francisco, Cal., participate in relief work in connection with the Jackson, Cal., mine disaster, when some 48 men were entombed alive in the mine. They transport various civilian mining experts from San Francisco to scene of disaster with great speed.
Aug. 29	Brackpapa at Milan, Italy, makes record speed flight 208.5 m.p.h. over 1 km. course.

Sept. 1 — During five days of first week in September, Army Air Service pilots, making aerial patrols of Oregon forests, located 127 new fires in actual flying time of 49½ hrs.

Sept. 1 — British pre-dreadnought *"Agamemnon"* theoretically sunk by air bombs in aircraft-battleship maneuvers off Isle of Wight.

Sept. 1 — Lt. C. C. Moseley, U. S. A. S., piloting a Fokker CO-4 airplane with Major F. H. Coleman as passenger, flies from McCook Field, Dayton, O., to Crissy Field, San Francisco, Cal., in 26 hrs. 15 min. actual flying time, despite fogs and a heavy storm which were encountered while flying over Wyoming.

Sept. 3 — 104th Squadron, Maryland National Guard, completes 2 weeks' encampment at Langley Field, Va., 15 officers and 83 enlisted men attending.

Sept. 5 — Lt. James H. Doolittle, U. S. A. S., breaks all records for flight across the continent from Jacksonville, Fla., to Rockwell Field, San Diego, Cal., in 21 hrs. 20 min. actual flying time, his elapsed time being 22 hrs. 35 min. A stop of 1 hr. 15 min. was made at Kelly Field, Tex., to replenish fuel supply. This was first time that flight across continent was made within 24 hrs.

Sept. 6 — Glenn H. Curtiss in "sail plane" flying boat, makes motorless flight tests at Port Washington, L. I., remaining aloft 49 sec.

Sept. 8 — Circuit race around Great Britain, first flown since 1913, for the cup presented by King of England, starts with 23 machines; won by F. L. Barnard in a DH-4 (360 h.p. Rolls Royce engine). Eleven airplanes complete the course, 810 mi.

Sept. 8 — Army Air Service sends two airplanes to Tallulah, La., co-operating with Department of Agriculture, in making aerial photographs of cotton fields in that locality infested with boll weevil, also in distributing from airplanes calcium arsenate poison over the fields.

Sept. 8 — San Francisco-Modesto, Cal. Air Express begun by Walter T. Varney.

Sept. 9 — During Police Field Days at Jamaica, L. I. race track September 9th-16th, Army Air Service pilots from Mitchel Field, N. Y., give aerial demonstration.

Sept. 9 — Mapping of Honolulu Harbor by Naval photographic planes is begun.

Sept. 11 — Army Air Service pilots from Mitchel Field, L. I., fly 6 planes to Syracuse, N. Y., during New York State Fair.

Sept. 14 — L. W. F. reconstructed *"Owl,"* the largest bombing airplane so far built for the Army Air Service, given trial flight at Mitchel Field, L. I.

Sept. 14 — Aeromarine flying boats on Great Lakes Division carry U. S. mail. Postmaster Smith of Detroit escorts first cargo.

Sept. 14 — Fifty-four persons fly in Aeromarine flying boats between Cleveland and Detroit. *"Wolverine"* carries 10 passengers and baggage round trip; *"Buckeye"* same number; *"Santa Maria"* 14 passengers and baggage from Detroit to Cleveland.

Sept. 14 — U. S. Army Airship C-2 starts transcontinental flight.

Sept. 16 — Upon radio warnings failing to reach a vessel from Porto Rico bound for Santo Domingo and imperiled by tropical storm, a Marine Corps plane piloted by Capt. Presley searches out the ship and drops warning upon the deck.

Sept. 17	Aeromarine Airways, Inc., closes Detroit-Cleveland season, having carried 1,829 passengers, 2,574 lbs. freight in 2 mos.
Sept. 17	Army Air Service non-rigid airship C-2 arrives at Brooks Field, San Antonio, Tex., from Langley Field, Va., after non-stop flight from Scott Field, Belleville, Ill., in 15 hrs. 50 min.
Sept. 20	During week special torpedo plane practice held 60 mi. east of Cape Henry, 18 planes and 3 battleships participating. Seventeen torpedoes released and only 1 failed to function.
Sept. 23	Army Airship C-2 arrives at Ross Field, Arcadia, Cal., from Langley Field, Va., first transcontinental flight in lighter-than-air craft.
Sept. 23	102d Observation Squadron, N. Y. National Guard, begins operations from Miller Field, S. I.
Sept. 23	Annual flying meet held Logan Field, Baltimore, Md.; Lt. Chase, Navy Department, in a Navy TS wins 30 mi. handicap race.
Sept. 23	Official proclamation of U. S. State Department setting forth conditions of the provisional government of the Dominican Republic distributed by U. S. M. C. airplanes throughout the Island.
Sept. 24	Fourteen Detroit Shriners attend convention in Cleveland, arriving aboard 2 Aeromarine flying boats.
Sept. 24	Four hundred and three passengers make sightseeing flights in Aeromarine flying boats around New York during period September 16-24.
Sept. 25	Lt. Talcott P. Smith, U. S. A. S., makes non-stop flight from McCook Field, Dayton, O., to Bolling Field, D. C., in 2 hrs. 50 min.
Sept. 26	U. S. Navy torpedo planes in maneuvers off Virginia Capes.
Sept. 26	Wright Aeronautical Corporation air yacht, *"Wilbur Wright,"* christened at New York by Miss Katherine Wright, sister of the inventor.
Sept. 29	Lt. Crocker, U. S. A. S., returns from cross-country trip to Fargo, N. D., covering approximately 2,300 mi. in 36 hrs. 25 min. flying time.
Sept. 30	M. Fernand Lasne, French pilot, flying Nieuport-Delage biplane (320 h.p. Hispano motor) wins Deutsch de la Meurthe cup at Ville Sauvage Airdrome, France, completing circuit of 186 mi., average speed 179.6 m.p.h.
Sept. 30	Naval HS-2-L makes flight from Coco Solo Air Station, Canal Zone, to Nombre de Dios, the exact point where Christopher Columbus first set foot on the soil of the western hemisphere.
Sept. 30	Crew is changed aboard airship C-7 at Hampton Roads Naval Air Station by means of rope ladder while airship is in flight.
Sept.	Lt. M. B. Asp, U. S. A. S., in *"Ant"* sport plane, wins Southern Aerial Derby Cup at Galveston, Tex.
Sept.	Grand Prize of Italy at the International Airplane competition, Milan, Italy.
Oct. 1	Goodyear Tire & Rubber Company starts work on 300 ft. semi-rigid airship for U. S. Army at Akron, Ohio.
Oct. 1	International Aeronautic Federation holds annual meeting at Rome, Italy.

Oct. 1 Six Cleveland bankers fly from that city to Coburg, Ontario, on fishing trip in Aeromarine flying boat.

Oct. 1 During aerial mapping project in Tennessee, Capt. A. W. Stevens with Lt. Geo. W. Polk, U.S.A.S., in 2 mos. expose, develop, number, plot and print negatives covering 5,000 sq. mi. of that state.

Oct. 2 All speed records between San Francisco and Los Angeles, Cal., broken by Lt. Walter Miller, U. S. A. S., when he flies distance in 2 hrs. 58 min., cutting previous record by 7 min.

Oct. 4 Lt. J. J. O'Connell, U. S. A. S., completes cross-country flight in DH-4-B plane from Kelly Field, San Antonio, Tex., to Mitchel Field, L. I., N. Y., and return.

Oct. 5 Mapping of Sumay and the Air Station at Guam, Miday Island, begun by Navy Department.

Oct. 6 Lts. Oakley Kelly and J. A. Macready, U. S. A. S., in Fokker Army T-2 established longest duration flight at San Diego, Cal., 35 hrs. 18 min. 30 secs. (unofficial).

Oct. 8 Lt. A. W. Gorton, U. S. N., in Navy TR-1 Lawrance engine, wins Curtiss Marine Flying Trophy Race for seaplanes at Detroit, Mich.—160 mi. at 112.65 m.p.h.

Oct. 12 Lt. R. H. Harris, U. S. A. S., in Dayton Wright *"Honeymoon Express,"* wins Aviation Country Club of Detroit Trophy Race for light commercial planes at Selfridge Field, Mt. Clemens, Mich.—257.7 mi. at 135.1 m.p.h.

Oct. 12 Lt. Eric H. Nelson, U.S.A.S., wins Detroit News Air Mail Trophy Race for multi-motored planes in Martin Transport at Selfridge Field, Mt. Clemens, Mich.—257.7 mi. at 105.1 m.p.h.

Oct. 13 Lt. T. K. Koenig, U. S. A. S., in Packard-Lepere, wins Liberty Engine Builders Trophy Race for observation planes at Selfridge Field, Mt. Clemens, Mich.—257.7 mi. at 128.8 m.p.h.

Oct. 14 Aeromarine Airways operates aerial ferry during Pulitzer Air races between Detroit and Selfridge Field, carrying Secretary of Navy Denby, Assistant Secretary of War Wainwright, Wing Commander Christie, British Air Attache, Admiral Moffett, etc.

Oct. 14 Pilots Bossoutrot and Drouhin in Farman *"Goliath"* at Le Bourget, France, makes official duration flight—34 hrs. 14 min. 8 1/5 sec.

Oct. 14 Lt. D. A. Stace, U. S. A. S., in Thomas-Morse MB-3, wins John M. Mitchell Trophy Race for 1st Pursuit Group at Selfridge Field at 148 m.p.h.

Oct. 14 W. H. Beech in Laird *"Swallow"* wins "On to Detroit" Race, Wichita, Kans. to Detroit.

Oct. 14 Lt. R. L. Maughan, U. S. A. S., in Army Curtiss Biplane, wins Pulitzer Trophy Race at Selfridge Field, Mt. Clemens, Mich., 250 mi. at 205.8 m.p.h.; also world's record for 100 km. at 205.31 m.p.h., and 200 km. at 205.94 m.p.h.

Oct. 14 16th Squadron (Observation), Army Air Service, stationed at Fort Riley, Kans., participates in American Legion meet at Salina, Kans.

Oct. 16 Army Air Service pilots from Brooks and Kelly Fields, San Antonio, Tex., give air demonstration at 4th Annual Convention of American Legion in New Orleans.

Oct. 17	Army Dirigible C-2, which successfully accomplished a flight across the continent, and which made a stop at Brooks Field, San Antonio, Tex., while en route to home station, is destroyed while leaving hangar, due to a sudden gust of wind, throwing the ship against the hangar door and tearing envelope.
Oct. 18	Brig. Gen. William Mitchell, U. S. A. S., breaks world's straightway speed record over 1 km. course, official—224.58 m.p.h. Former record made by Sadi Lecointe in Nieuport-Delage at Etampes, France, Sept. 21, 1922—213.575 m.p.h.
Oct. 19	Two DH-4-B planes of the Marine Corps carry California delegate from San Francisco to the American Legion Convention at Los Angeles.
Oct. 20	The Air Service Field Officers School at Langley Field, Va., commences 1922-1923 term with 17 students.
Oct. 21	New Aeromarine high-lift wing doubles carrying capacity of U. S. Air Mail planes.
Oct. 21	Municipal landing field at Media, Pa., formally opened in presence of representatives of the Army Air Service and officers of the National Guard from Pennsylvania and Maryland.
Oct. 21	A 1,715 mi. cross-country flight in a DH-4-B airplane from Boston to Detroit completed by Lt. R. C. Moffatt, pilot, and James T. Williams, passenger, total flying time being 19½ hrs.
Oct. 25	Army Air Service personnel at Bolling Field, D. C., conduct aerial exhibition.
Oct. 27	Scores of land and seaplanes from many Naval and Marine Corps stations co-operate in demonstrations in honor of Navy Day.
Oct. 27	International Commission for Aerial Navigation holds first public session at London, England.
Nov. 1	Mooring mast completed by U. S. Naval Bureau of Aeronautics at Lakehurst, N. J.
Nov. 8	Aeromarine Airways flagship *"Santa Maria"* completes 50,000 mi. of flying service on opening of 1922-23 Key West-Havana season.
Nov. 9	Army Air Service pilots, 16th Squadron, hold aero meet at Fort Riley, Kans.
Nov. 10	Second Annual Aviation Meet at Hartford, Conn.
Nov. 10	Army airship D-3 completes flight from Aberdeen Proving Grounds, Md., to Hartford, Conn., and return.
Nov. 11	Kansas City, Mo., celebrates Armistice Day with aerial exhibition at opening of the Air Port of Air Terminal Association.
Nov. 14	Navy seaplane flies to assistance of burning fishing vessel off Sunset Cliffs, San Diego, Cal.
Nov. 14	Lts. Oakley Kelly and J. A. Macready, U. S. A. S., in Fokker Army T-2, make record non-stop flight, San Diego, Cal., to Indianapolis, Ind., 2,060 mi.
Nov. 15	Terminal started at Seville, Spain, for Zeppelin airship line to Buenos Aires, Argentina.
Nov. 15	U. S. M. C. establish Air Mail service between Santo Domingo, D. R., and Santiago.
Nov. 17	Navy F-5-L flying at height of 7,000 ft. throws a sleeve target 3,000 ft. astern. This target is shot at by 3-in. anti-aircraft guns from Fortress Monroe.

Nov. 18	Burning of railroad bridge near Quantico, Va., suspends rail service. Marine Corps establishes air mail between coast and Washington, D. C., and operates it on schedule.
Nov. 19	Belvin W. Maynard Benefit meet at Curtiss Field, Garden City, L. I.
Nov. 22	16th Annual Meeting and Dinner of the Aero Club of New England held at Harvard Club, Boston, to commemorate 139th anniversary of the first ascent of man (in a balloon at Paris, France).
Nov. 22	Navy F-5-L conducts radio tests in connection with ship steering cable across channel of New York Harbor at Fort Hamilton.
Nov. 23	Army aviators at Bolling Field, D. C., stage aerial exhibition.
Nov. 23	Lts. H. B. Wyatt and G. E. Owens, U. S. M. C., in DH-4-B planes, arrive in San Francisco from Washington, D. C.
Nov. 23	Coast Artillery and Air Service hold Aerial Target practice at Fortress Monroe, Va.
Nov.	Lucien Bossoutrot in Farman F-90 5-passenger 300-h.p. Salmson engine wins 100,000 franc Grand Prize of Paris in French air transport competition.
Dec. 2	Navy photographic planes take 4,000 photographs for air mosaic of territory from San Diego, Cal., to Mexican border.
Dec. 2	During the week U. S. M. C. airplanes from Quantico, Va., made 33 flights over the Virginia forest reservations for patrol purposes.
Dec. 7	Army Air Service pilots from Brooks Field, San Antonio, Tex., make cross-country flight to Rockwell Field, San Diego, Cal.
Dec. 9	U. S. Navy Mission leaves for Brazil with aviation members.
Dec. 11	Aeromarine 11-passenger flying boat *"Cordeaux"* opens 1922-23 Aeromarine Service between Miami and Nassau.
Dec. 15	8th International Aeronautic Exposition, Paris, France.
Dec. 20	Governor Cordeaux christens Aeromarine 11-passenger flying boat bearing his name at Nassau in the Bahamas.
Dec. 22	New York-Newport Air Service, utilizing Loening Air Yachts, announced.
Dec. 28	Passalova, in Italy, makes 172.7 m.p.h. in seaplane.
Dec. 30	Aeromarine flying boat *"Cordeaux"* flies between Nassau and Miami, covering distance of 187 mi. in 1 hr. 56 min.

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